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Side Delivery—Flue Dust Car

50 Ton Center Bottom Dump Scale Car

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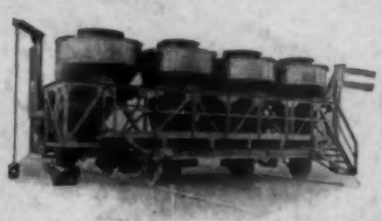

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Electric Ore Transfer Car

COMPLETE COKE OVEN EQUIPMENT

Pushers and Levelers — Door Extracting Machines
Coal Charging Larries — Quencher Locomotives — Coke Quenching Cars

The ATLAS Car and Mfg. Co.

ENGINEERS — *Cleveland, Ohio* — *MANUFACTURERS*

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KOPPERS
BY-PRODUCT COKE OVENS

The first Koppers by-product coke plant in America was built at Joliet, Ill., in 1908. At that time, approximately FOUR MILLION tons of coal per annum were carbonized in by-product coke ovens. Today, approximately SIXTY MILLION tons of coal per annum are carbonized in by-product ovens.

Koppers ovens in operation today—totalling over six thousand four hundred—have a carbonizing capacity of FORTY-TWO MILLION tons of coal per annum. In other words, SEVENTY-FIVE PER CENT of the increased by-product coking capacity is in Koppers ovens.

The development in the method of manufacturing coke was an economic one—just as logical as the development in the methods of manufacturing iron and steel; and this astounding growth of the Koppers by-product oven was the recognition by the iron and steel industry generally that the Koppers system of by-product coking and by-product recovery was the perfecting of this development to the highest point of efficiency.

OUTSTANDING FEATURES OF THE KOPPERS OVEN ARE:

First: Strong construction—which means long life and low repair costs.

Second: Perfect heat control and distribution—insuring the most flexible operation and the best results in coke quality and quantity of by-products.

Third: Ability to heat ovens either with coke oven gas or with outside gases, such as producer gas, water gas or blast furnace gas—thus releasing all the rich coke oven gas for use elsewhere. This principle is embodied in the Koppers "Combination" Oven.

Fourth: Accessibility of all parts of oven for inspection, thus making it easy to correct any irregularities which might affect operating results.

Fifth: Simplicity of operation—resulting in low labor costs.

Sixth: Ability to make satisfactory blast furnace and foundry coke from the widest range of coals.

THE KOPPERS COMPANY
PITTSBURGH, PA.

DESIGNERS AND BUILDERS OF BY-PRODUCT COKE AND GAS OVEN PLANTS

Vol. LXVIII THE IRON TRADE REVIEW No. 22
Registered U. S. Patent Office
Cleveland, June 2, 1921

Competition Grows, Prices Sag

Limited Amount of New Business Brings Increasing Concessions—Leading Wire Producers Reduce $5—Automobile Production Is Scaling Down—Railroads Buy Track Material More Freely—German Steel Is Offered

NEW business in iron and steel is so light that producers find difficulty in maintaining operations even on a low fractional basis. Sharp competition with consequent price concessions is developing in many lines. The situation in several respects appears less favorable than a few weeks ago. Buyers are persisting in an indifferent attitude except where needs are pressing. The automobile and building industries which offered some encouragement now are showing a decreased demand for steel.

Steel corporation plants which as a rule, are doing a little better than the independents, are running around 35 per cent. At Chicago, the leading independent is 25 per cent engaged. Mahoning valley activities this week are 20 per cent of ingot and 30 per cent of sheet capacities. A large Youngstown interest is on the lowest rolling basis in its history with only one rod mill in operation.

Prices Are Softer

Almost every line of iron and steel is showing signs of growing price softness. Of paramount interest has been the $5 per ton reduction named by all leading independent mills, bringing plain wire to 2.75c Pittsburgh, and wire nails to 3.00c. Plates in small lots have been sold in the week at a range of 2.00c to 2.20c Pittsburgh, with reports of 1.90c having been done on domestic tonnage. Revised bids on the 3000-ton Belle Isle bridge at Detroit opened last week indicate a plain material price around 1.90c Pittsburgh, by an independent mill, which however may be under the guise of an old protection. Hard steel bars have been offered as low as 1.75c Pittsburgh. Sharp competition has developed for 1750 tons of reinforcing bars for a Cleveland reservoir for which the general contract has just been placed and severe shading on new steel is indicated. Mill pipe is showing concessions and sheets are soft.

Indication of the drop in market values is seen in THE IRON TRADE REVIEW composite market average this week. The figure is $42.75. Last week it was $43.03, two weeks ago $43.05, and in all May $43.32. The comparative average for June, 1914, was $22.58.

Railroads in Market

Buying of track material by the railroads is in larger total. The Southern Pacific has placed 13,500 kegs of spikes with the Colorado producer at 3.50c base, mill. The Missouri Pacific closed 2000 kegs. The Pennsylvania has placed 1800 tons of tie plates and Atlantic Coast Line has inquired for 3000 tons. The New York Central is out for 125,000 track bolts.

Automobile production continues to slip. Generally operations have been so dependent upon current orders that any change in the volume of new business is quickly reflected. The Dodge and Buick plants have cut their schedules and it is reported the Ford Motor Co. which has been the mainstay of the recent flurry is preparing to materially reduce its output. In its tractor division, the schedule has been reduced 40 to 45 per cent.

Basic pig iron now is obtainable at $21.50 valley. Chicago iron has been purchased at St. Louis on the basis of $21 furnace. Except for a slightly better activity at St. Louis, the iron market continues dull with a tendency toward still lower prices.

German Steel Offered

Offerings of foreign material in this country are increasing. German sheet bars have been quoted at $34 seaboard, and German steel castings in northern Ohio at ½ cent per pound under the domestic price. German rail mills have named $51 per ton delivered to South America, underbidding American producers $5 to $6 per ton. Belgian tank plates have been quoted at 2.57½c duty paid, San Francisco.

Reports that a leading operator has sold a tonnage of lake ore in the East at a reduction of 75 cents per ton over last year are denied officially. The season's ore market is yet to be opened. One of the largest independent producers of ore put in effect June 1, a drastic program of curtailment in its mining operations and attendant activities on the several ranges. Offerings of foreign ore at 8 to 10 cents per unit at eastern ports fail to interest.

THE IRON TRADE REVIEW

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Steel Industry Takes Counsel

THOSE iron and steel makers who regard the present business situation of the country as bad, but who firmly believe in the prosperity of the United States over the long future, did not come away from the nineteenth general meeting of the American Iron and Steel institute with any greater degree of optimism than they took with them. They found that those men who are looked upon as leaders of thought and expression in the industry held to the view that the process of readjustment to a normal level has not been completed. Chief of the factors which require readjustment, in the opinion of such men as James A. Campbell and Charles M. Schwab, is the cost of transportation. Summing up the statements that were made, there must be a readjustment of a character sufficiently far-reaching to place all prices on a reasonable and relative basis. In the process of readjustment, it was pointed out, the cost of living has a definite relation to compensation and wages should not be reduced more rapidly than the cost of living justifies.

Numerous grains of comfort were interspersed through the various addresses. Willis L. King recalled that conditions in the depression of 1893 were much worse than they now are. It was pointed out that the iron and steel companies, as a result of the prosperity through which they recently passed, are in good financial condition to tide them through the present period.

Undoubtedly, one of the most important features emphasized at the meeting was the necessity for economy. As Charles M. Schwab put it, the industry must learn to economize rigidly if it is going to be conducted on a basis which will enable it to compete for the business of the world. "I think this period is going to redound to the advantage of the industry," said Mr. Schwab, "and when it is over, we will look back and think it has been a fine thing."

Those present all felt confident in the future of the industry but it remained for Joseph G. Butler Jr. adequately to express this sentiment. In a letter which he sent to Mr. King and which the latter read to the institute, Mr. Butler granted that the present is a critical period but that there is no occasion for alarm. "Every decade or so," Mr. Butler said, "capacity for production has been increased in excess of what was necessary but the experience has been that this excess capacity was soon absorbed in the constantly growing needs of the country. Considering the natural growth of our country and the diversion of iron and steel products from domestic markets during the period of the world war, present productive capacities are not greatly, if at all, in excess of the probable needs under normal conditions."

Thus was presented at the institute meeting a thorough discussion and complete analysis of the business situation in iron and steel from the standpoint of both the present and the future. Clearly, economy, sagacity, faith and courage must be the watchwords of the industry at this time. The hope of better times to come is of an insistent and abiding character, and it was once more apparent that the future of the industry is safe in the hands of the men who clearly are seeing and at last week's institute meeting, expressed, the economic needs of their own business and of the country at large.

Business Wins First Round

SECRETARY of Commerce Hoover has emerged a victor from his first brush with congress. The house last week granted him the chief items he requested for furthering the work of the bureau of standards and the bureau of foreign and domestic commerce, and only withheld other items because the deficiency bill for the fiscal year 1921 could not legally include appropriations for the fiscal year 1922.

While the country at large has entertained no misgivings concerning Secretary Hoover's ability and sincerity, congress, always cynical and political, has been watching him with a suspicious eye. His requests,

therefore, were scrutinized with unusual care in the house appropriations committee and on the floor.

No man living has seen so many congresses and Presidents and departmental secretaries come and go as Representative Cannon, of Illinois, and on the floor of the house he declared in the course of discussion of the Hoover requests: "I never saw Mr. Hoover until he came into the appropriations room to be heard. I will confess that I had a prejudice against him...He captured me; the prejudice disappeared."

Such confession is good not only for the soul but for those who brave the storm of cynicism and political chicanery that breaks upon all federal officeholders and endeavor to serve their country at a sacrifice not only of finances but of peace of mind. If the senate will play as squarely with Secretary Hoover as the house has it will do much toward reinstating the country's confidence in it.

An Undeveloped Market

THE policy of calmly waiting for something to happen seems to be spreading among manufacturers of the country. This is particularly true of machine tool builders. In this line, it is assumed the market can only return in some mysterious way dependent upon the national situation or upon fixed curves of production against which any individual struggle is futile. One manufacturer in speaking recently before a meeting of machine tool builders expressed the opinion that instead of quietly waiting, the successful builder of tomorrow was the one who is doing the most hustling at the present time.

This is perhaps an old story, yet the speaker sounded a new note among machine tool builders. "We can get business even in the present depressed market", he said. "We may have to create markets, we may have to help finance industries, but these are not insurmountable obstacles." The question naturally arising in a machine tool builder's mind is "What new markets can be developed?" He is surprised there are any new markets left. As a matter of fact, there are probably many markets only waiting for the ingenuous manufacturer to discover.

It has been only during the last few years that the regrinding of cylinders outside of automobile factories has been considered practical. Within the last few months some grinding tool manufacturers have started a vigorous campaign to develop the field of regrinding, not only cylinders, but pistons, crankshafts and other wearing parts. The equipment necessary to do this work is more expensive than the garage or repair shop is warranted in buying. The solution seems to be found in the small machine shop which is independent of any garage. Such a machine shop will deal directly with the garages, and not with the individual owners. The combination of such a machine shop with an electric welding shop seems to be an excellent one. The manufacturers who are developing this field are offering to help finance machine shop owners and to carry on educational campaigns to acquaint automobile owners with the advantages of regrinding.

The Unions and Business Depression

THE collapse of the molders' strike, begun several months ago in the leading foundry centers of the country as a protest against wage reductions, is no indication that the trade unions have been broken, though in some instances the return of the men has been heralded as a victory for the open shop. Not much significance attaches to the fact that strikers give up their struggle and seek work "without agreements" in periods of general business depression.

The truth is, that which suppresses business activity likewise reacts against unionism, for a time. But just as soon as business picks up and there is a demand for men, labor organizations also flourish. In an extremity, men think more of themselves individually and their families, of how they shall be fed, clothed and sheltered than they do of the principles of unionism. The strength of trade organizations increases in proportion as business develops; men have more money to contribute to them.

It is not right, however, to assume that the evils of trade unionism necessarily must increase with the size or power of the organization, though experience indicates they do. The wrongs which result from the association cannot be curbed by seeking to limit its membership. But as its membership grows it becomes increasingly important that it be regulated. Reasonable regulation accepted in the proper spirit would be trade unionism's greatest safeguard. Let the unions reflect on the fact that it was the contempt for law and order and for reasonable regulation that brought prohibition upon the liquor interests. These could not stop until their "sacred rights" were taken from them.

This anticipates the future. Trade revival will find the union men renewing demands for recognition. It will be found that the unions have not been stamped out. As the descent, or process of deflation, has been marked by many strikes and labor difficulties, so will be the upward path when business revives. All the advantage which the unions have lost they will seek to regain when the services of their members are in greater demand. And they may be depended on to try to make up for lost time.

Unions which apparently are dropping out one by one, here and there, will seek to muster their forces. The fear of this cannot possibly stem the downward sweep of wages and prices, but it is well for employers to reflect that unionism is not "dead". The present and future calls for greater care in dealing with the problem than did the immediate past.

Iron and Steel Prices

CORRECTED TO WEDNESDAY NOON—SCRAP, WAREHOUSE, ORE AND OTHER PRICES ON PAGES 1552 AND 1556

Pig Iron

Bessemer, valley	$24.00
Bessemer, Pittsburgh	25.96
Basic, valley	21.50 to 22.00
Basic, Pittsburgh	23.46 to 23.96
Basic, Buffalo	25.00 to 26.00
Basic, delivered, eastern Pa.	24.75 to 25.00
Malleable, valley	23.00 to 24.00
Malleable, Pittsburgh	24.96 to 25.96
Malleable, Chicago	23.00
Malleable, Buffalo furnace	24.00 to 25.00
Malleable, del., eastern Pa.	28.50 to 29.50

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern foundry	1.75 to 2.25
No. 2X East'n and Virginia	2.25 to 2.75
No. 1X Eastern	2.75 and up
No. 1 Chicago	2.25 to 2.75
No. 2 foundry Eastern	1.75 to 2.25

No. 1X, eastern del. Phila.	26.00 to 27.50
No. 1X, Buffalo	27.00 to 28.00
No. 2 foundry, valley	23.00 to 23.50
No. 2 foundry, Pittsburgh	24.96 to 25.46
No. 2 foundry, Buffalo	24.00 to 25.00
No. 2 foundry, Chicago	22.50 to 23.00
No. 2 foundry Ironton furnace	23.00 to 24.00
No. 2 foundry, Cleveland	25.00 to 25.50
No. 2X, eastern del. Phila.	25.50 to 26.50
No. 2X, eastern N. J., tidewater	26.30 to 27.45
No. 2X, eastern del. Boston	28.06 to 30.06
No. 2X foundry, Buffalo fur.	25.25 to 26.25
No. 2X, Buffalo del. Boston	30.71 to 32.71
No. 2 foundry del. Philadelphia	24.85 to 25.50
No. 2 foundry, N. J., tidewater	25.30 to 26.95
No. 2 southern, Birmingham	22.50 to 23.00
No. 2 southern, Cincinnati	26.50 to 27.50
No. 2 southern, Chicago	28.66 to 29.66
No. 2 southern, Philadelphia	28.66 to 31.66
No. 2 southern, Cleveland	28.66 to 29.66
No. 2 southern, Boston	30.65 to 32.65
No. 2 southern, St. Louis	27.72 to 28.72
No. 2X, Virginia furnace	27.00
No. 2X, Virginia Philadelphia	32.74 to 33.74
No. 2X, Virginia Jersey City	33.29 to 34.29
No. 2X, Virginia Boston	30.58 to 31.83
Gray forge, eastern Pa.	25.25 to 26.00
Gray forge, val., del. Pitts.	23.96
Low phos., standard, valley	39.00 to 40.00
Low phos., standard, Phila.	43.32
Low phos., Lebanon furnace	35.00
Charcoal, Superior, Chicago	38.50
Charcoal, Birmingham	35.00

Silvery Iron
8 per cent base

Jackson County, O., furnace	35.40
Tennessee, Chicago delivery	nominal
Ohio brands, Chicago	40.32

Bessemer Ferrosilicon
Jackson County, Ohio, furnace

10 per cent	$45.00
11 per cent	48.30
12 per cent	51.60

Coke

Connellsville furnace	$3.00 to 3.50
Connellsville foundry	4.00 to 5.00
Pocahontas furnace	8.00 to 8.50
Pocahontas foundry	8.50 to 9.50
New River furnace	6.50 to 7.50
New River foundry	8.00 to 9.50
Wise county furnace	6.00 to 7.50
Wise county foundry	6.50 to 8.00
Alabama furnace	6.00 to 6.50
Alabama foundry	7.00

Ferroalloys

Ferromanganese, 80 per cent, delivered, domestic metal	$77.50 to 85.00
Ferromanganese, 80 per cent, English, c.i.f. Atlantic port	75.00 to 100.00
Spiegel, 18 to 22 per cent furnace spot	30.00 to 32.50
Ferrosilicon, 50 per cent, contract delivered	75.00 to 90.00
Ferrotungsten, standard, per pound contained	48.00c to 55.00c
Ferrochrome, 60 to 70 chromium, 6 to 8 carbon, per pound contained, maker's plant	15.00c to 16.00c
Imported ferrochrome, 6 to 8 per cent carbon	14.00c to 15.00c
Ferrovanadium, 30 to 40 per cent per pound estimated, according to analysis	$5.00 to 6.50
Ferro carbon-titanium, carloads, producers plant, per net ton	$200.00

Semifinished Material

BILLETS AND BLOOMS
(4 x 4-inch)

Open-hearth, Pittsburgh	$37.00
Open-hearth, Youngstown	37.00
Open-hearth, Philadelphia	42.74
Bessemer, Pittsburgh	37.00
Pittsburgh and Youngstown	37.00
Forging, Pittsburgh	42.00
Forging, Philadelphia	47.74

SHEET BARS

Open-hearth, Pittsburgh	$37.00 to 39.00
Open-hearth, Youngstown	37.00 to 39.00
Bessemer, Pittsburgh	37.00 to 39.00
Bessemer, Youngstown	37.00 to 39.00

SLABS

Pittsburgh and Youngstown	35.00 to 38.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$48.00
Grooved skelp, Pittsburgh	2.10c to 2.20c
Universal skelp, Pittsburgh	2.10c to 2.20c
Sheared skelp, Pittsburgh	2.10c to 2.20c

Shapes, Plates and Bars

Structural shapes, Pittsburgh	2.10c to 2.20c
Structural shapes, Philadelphia	2.45c to 2.55c
Structural shapes, New York	2.48c to 2.58c
Structural shapes, Chicago	2.48c to 2.58c
Tank plates, Pittsburgh	2.00c to 2.20c
Tank plates, Chicago	2.38c to 2.58c
Tank plates, Philadelphia	2.35c to 2.55c
Tank plates, New York	2.38c to 2.58c
Bars, soft steel, Pittsburgh	2.00c to 2.10c
Bars, soft steel, Chicago	2.38c to 2.48c
Bars, soft steel, New York	2.38c to 2.48c
Bars, soft steel, Philadelphia	2.35c to 2.45c
Bar iron, common, Chicago	2.38c
Bar iron, common, Philadelphia	2.35c
Bar iron, common, New York	2.38c
Bar iron, common, del. Pitts.	2.45c to 2.86c
Hard steel bars, Chicago	2.00c to 2.25c

Rails, Track Material

Standard bessemer rails, mill	$45.00
Standard open-hearth rails, mill	47.00
Relaying rails, St. Louis	27.50 to 30.00
Relaying rails, Pittsburgh	32.00 to 35.00
Angle bars, Pittsburgh base	2.75c
Angle bars, Chicago base	2.75c
Light rails, 25 to 45, mill	2.20c
Spikes, railroad, Pittsburgh	3.25c to 3.40c
Spikes, railroad, Chicago	3.63c to 3.78c
Track bolts, Pittsburgh	4.35c
Track bolts, Chicago	4.73c
Tie plates, Chicago	2.50c
Tie plates, Pittsburgh	2.50c

Wire Products

(100 lbs. to jobbers, carloads; retailers, 10c more)

Wire nails, Pittsburgh	$3.00 to 3.25
Plain wire, Pittsburgh	2.75 to 3.00
Galvanized wire, Pittsburgh	3.45 to 3.70
Barbed wire, painted, Pitts.	3.15 to 3.40
Barbed wire, galv., Pittsburgh	3.85 to 4.10
Polished staples, Pittsburgh	3.25 to 3.40
Galvanized staples, Pittsburgh	3.85 to 4.10
Coated nails per count keg, Pitts.	2.85

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Chain, Piling, Strip Steel

Chain, 1 in. proof coil, Pitts.	6.25c
Sheet piling base, Pittsburgh	2.25c to 2.55c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100-inch and heavier, Base per 100 pounds 5.00c to 5.50c

Sheets

SHEET MILL BLACK

No. 28, open-hearth, Pittsburgh	4.00c
No. 28, bessemer, Pittsburgh	4.00c
No. 28, open-hearth, Chicago	4.38c
No. 28, open-hearth, Phila.	4.35c

TIN MILL BLACK

No. 28, open-hearth, Chicago	4.00c
No. 28, open-hearth, Phila.	4.00c

GALVANIZED

No. 28, open-hearth, Pittsburgh	5.00c
No. 28, bessemer, Pittsburgh	5.00c
No. 28, open-hearth, Chicago	5.38c
No. 28, open-hearth, Phila.	5.35c

BLUE ANNEALED

No. 10, open-hearth, Pittsburgh	3.10c
No. 10, bessemer, Pittsburgh	3.10c
No. 10, open-hearth, Chicago	3.48c
No. 10, open-hearth, Phila.	3.45c

Tin Plate

(Per 100 lb. box)

Tin plate, coke base, Pittsburgh	$6.25

Iron and Steel Pipe

Base Discounts Pittsburgh to Jobbers Carloads

	Black	Galv.
½ to 3-inch, butt steel	62½	50
½ to 1½-inch, butt iron	35½	20½

Full pipe schedule page 1556.

Boiler Tubes

Steel, 3¼ to 13 inches, c. l.	47 off
Iron, 3½ to 4½ inches, c. l.	26 off

Full boiler tube schedule page 1556.

Cast Iron Water Pipe

Without War Freight Tax
Class B Pipe

Four-inch, Chicago	59.10 to 64.10
Six-inch and over, Chicago	54.10 to 59.10
Four-inch, New York	69.30 to 70.30
Six-inch and over, New York	59.30 to 60.30
Four-inch, Birmingham	50.00 to 55.00
Six-inch and over, Birmingham	45.00 to 50.00
Three-inch, Birmingham	60.00 to 65.00

Class A pipe is $4 higher than Class B

Hoops, Bands, Shafting

Hoops, Pittsburgh	2.75c
Bands, Pittsburgh	2.75c
Hot rolled strip steel, Pittsburgh stamping quality	2.75c
Cold finished steel bars, Pittsburgh base	3.10c

Rivets

Structural rivets, Pittsburgh	3.15c to 3.40c
Boiler rivets, Pittsburgh	3.25c to 3.50c
Rivets, ⅞ in. and smaller, Pittsburgh	60-10-10 and 65-10-5

Nuts and Bolts

Prices f.o.b. Pittsburgh, Packages of 50

CARRIAGE BOLTS
(⅜ x 6 inches, smaller and shorter)

Rolled thread	60-5 off
Cut thread	50-10-5 off
Larger and longer	50-10 off

MACHINE BOLTS
(⅜ x 4 inches, hot pressed nuts)

Rolled thread	60-10-10 off
Cut thread	60-10 off
Larger and longer	60 off
Plow bolts Nos. 1, 2 and 3 heads	50-10-5 off
Other style heads	50-10-5+20%
Stove bolts in packages	80-10 off
Stove bolts in bulk	80-10-2½ off
Cold pressed semifinished hexagon nuts ⅝ in. and larger	70-10-10 off
Cold pressed semifinished hexagon nuts ⅞ in. and smaller	80-10 off
Gimlet and cone point lag screws	65 off

NUTS
(Up to 1¾ and 1½ inches inclusive)

Hot pressed, square blank	$4.00 off
Hot pressed, square tapped	3.50 off
Hot pressed, hexagon blank	4.00 off
Hot pressed, hexagon tapped	3.50 off
Cold pressed, square tapped	3.50 off
Cold pressed, square blank	4.00 off
Cold pressed, hexagon tapped	3.50 off
Cold pressed, hexagon blank	4.00 off

Prices Present and Past

Representative market figures yesterday, one month ago, three months ago and one year ago

	June 1, 1921	May 1921	March 1921	June 1920
PIG IRON—				
Bessemer, valley, del., Pittsburgh	$25.96	$26.06	$28.96	$44.25
Basic, valley, del., Pittsburgh	23.46	23.96	26.56	45.05
No. 2 Foundry, val. del. Pitts.	24.96	25.56	27.96	45.40
No. 2 Foundry, Chicago	22.50	22.85	26.00	43.00
Lake Superior charcoal, Chicago.	38.50	38.50	38.50	57.50
Malleable, valley	23.50	24.10	26.40	43.25
Malleable, Chicago	23.00	23.35	26.50	43.50
*Southern No. 2, Birmingham	22.00	22.50	25.70	42.30
*Southern Ohio, No. 2, Ironton	24.00	24.50	27.50	44.00
Basic eastern del. eastern Pa.	25.00	25.00	26.20	44.00
**No. 2X, Virginia furnace	27.00	27.00	28.05	46.25
**No. 2X, eastern del., Phila.	26.00	26.10	27.40	46.90
Gray forge val., del. Pittsburgh.	23.96	24.81	26.96	42.90
Ferromanganese, 80 per cent, del.	80.00	83.00	89.90	198.00
SEMIFINISHED MATERIAL—				
Sheet bars, bessemer, Pittsburgh.	39.00	39.00	39.60	70.00
Sheet bars, open-hearth, Pitts.	39.00	39.00	39.60	75.00
Billets, bessemer, Pittsburgh	37.00	37.00	38.50	66.25
Billets, open-hearth, Pittsburgh	37.00	37.00	38.50	66.25
FINISHED MATERIAL—				
Steel bars, Pittsburgh	2.10	2.10	2.00	3.25
Steel bars, Chicago	2.48	2.48	2.38	3.52

	June 1, 1921	May 1921	March 1921	June 1920
FINISHED MATERIAL—Continued				
Iron bars, Philadelphia	$2.35	$2.35	$2.55	$4.30
Iron bars, Chicago mill	2.25	2.45	2.63	3.75
Beams, Pittsburgh mill	2.10	2.20	2.10	3.25
Beams, Philadelphia	2.45	2.55	2.40	3.70
Beams, Chicago	2.48	2.58	2.50	3.67
Tank plates, Pittsburgh	2.10	2.20	2.05	3.50
Tank plates, Chicago	2.48	2.58	2.40	3.95
Tank plates, Philadelphia	2.45	2.55	2.40	3.80
Sheets, blk., No. 28, Pittsburgh	4.00	4.00	3.90	7.00
Sheets, blue anl., No. 10, Pitts.	3.10	3.10	3.05	5.00
Sheets, galv., No. 28, Pittsburgh	5.00	5.00	5.05	7.50
Wire nails, Pittsburgh	3.00	3.10	3.05	4.00
COKE—				
Connellsville furnace, ovens	3.25	3.25	4.55	14.50
Connellsville foundry, ovens	4.50	4.85	6.05	15.00
OLD MATERIAL—				
Heavy melting steel, Pittsburgh	13.50	13.60	15.00	25.30
Heavy melting steel, eastern Pa.	12.25	11.80	13.40	22.40
Heavy melting steel, Chicago	11.50	11.50	12.55	22.40
No. 1 wrought, eastern Pa.	15.50	15.25	18.70	33.50
No. 1 wrought, Chicago	11.50	11.85	13.50	28.00
Rerolling rails, Chicago	13.00	13.25	13.30	32.35

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

Pig Iron Sales Still Light

Only Current Needs Are Filled by Consumers—Greater Tendency Toward Lower Prices Shown—Chicago Iron Sells at St. Louis at $21—Valley Basic at $21.50—Japan Wants 1500 Tons

Philadelphia, May 31.—Pig iron orders in the eastern Pennsylvania district are increasing in numbers but the total is small. Large orders such as those recently placed by cast iron pipe makers are lacking. Some of the past week's business was at $23.50 eastern Pennsylvania furnace for No. 2 plain (1.75 to 2.25 silicon) but most of the week's business was at 50 cents or $1 higher. The lowest price done for Philadelphia delivery apparently was $24 furnace for No. 2 plain with $1 higher for No. 2X. (2.25 to 2.75 silicon. Some Virginia foundry iron has been sold in this district at $26 furnace for No. 2 plain and $27 for No. 2X. A couple of cars of Alabama foundry iron were sold here for the first time in some months but this business was placed without thought of competition. Basic iron is featureless. A few small lots of low phosphorus iron has been sold at $38 furnace for copper-free metal and $35 for copper-bearing iron. Malleable and gray forge are featureless. The Robesonia furnace now is expected to be blown in the middle of June on low phosphorus iron.

See Slightly Better Melt

Chicago, May 31.—While buying of pig iron in the Chicago market is confined to small lots, the total not being sufficient to be of importance, indications are that stocks in foundry yards are being reduced gradually and comparatively few melters have an excess. Although the market is extremely quiet, deliveries during May are considerably heavier than during April, continuing the gradual increase which has been noticeable for several months. With a larger proportion of blast furnace capacity active in the district than in other centers, somewhat more iron was produced last month than was shipped, but the excess is not large. At present the market is quotable at $22.50 to $23, for foundry iron containing silicon 1.75 to 2.25, but larger tonnages probably would command a better figure. The market has not been tested in recent weeks. An inquiry for 500 tons of malleable iron is about to be closed and bids as low as $22, Chicago, have been submitted. The market at present will average close to $22.50 for the base grade of foundry iron. With almost a three-day holiday over the week end, conditions at the beginning of the week are unusually slow, and this intensified the usual dullness at the end of the month. Special irons, low phosphorus and silveries, are extremely dull and melters apparently have small need for additional tonnage.

Improvement Still Missing

Boston, May 31.—The pig iron market in New England continues without feature, and with sales at so low a point that prices would mean little, even if out of line. As a matter of fact, prices in all sales reported during the week in New England have been within the range reported from other districts. Buffalo prices used to be an important

Composite Market Average

Representing the Combined Average Prices per Ton of Fourteen Leading Iron and Steel Products. Yesterday, One Week, One Month, Three Months, One Year and Seven Years Ago

June 1, 1921	May 25, 1921	May, 1921	March, 1921	June, 1920	June, 1914
$42.75	$43.03	$43.32	$45.37	$68.29	$22.58

Products Included Are Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe.

factor in controlling the New England market, but today this condition has altered, and the eastern Pennsylvania furnaces, as far as prices are concerned, control the situation. Four eastern Pennsylvania furnaces are offering iron at close to $24 at the furnace or $28.06 delivered for the base grade. The differentials on higher silicon grades are being shaded so that pig iron of the first two or three silicon grades can be obtained at prices close to the quotations for the base grade. An eastern Massachussetts consumer bought one car of No. 2X iron (2.25 to 2.75 silicon) at $24.50 at eastern Pennsylvania furnace or $28.06, delivered. A Rhode Island consumer bought one car of No. 2X iron (silicon 2.25 to 2.75) at $29.25 eastern Pennsylvania furnace or $33.11, delivered. This latter sale, which is at least $2.00 or $3.00 above the accepted market, is probably due to consumer's desire to buy a specified brand. Other sales reported include scattered car lots to Massachussets and Connecticut foundries, the lowest price being $28.00 delivered and the highest price $33.66, delivered. Resale iron has figured in some of the sales. One lot of 100 tons changed hands at a price of approximately $30.00 delivered. Southern iron has scarcely been represented in the New England market in two or three months, but one Birmingham furnace, the Sloss-Sheffield Iron & Steel Co., has recently issued a new price list which brings delivered iron from that district more nearly in line. The list in part is as follows: Silicon 1.75 to 2.25, $22.50; silicon 2.25 to 2.75, $23.00; silicon 2.75 to 3.25, $23.50. Inquiry continues meager and few dealers expect any noticeable improvement in buying for several months.

Small Lots at Higher Prices

New York, May 28.—Pig iron buying has been of comparatively limited proportions during the past week. While there were numerous transactions, these involved small tonnages as a rule, so that the total was comparatively small. The largest transaction reported during the past week was one of 500 tons. Prices which are being done on eastern Pennsylvania foundry iron, which comprises the bulk of the tonnage that is being sold here, range from $24 to $24.50, furnace, on 1.75 to 2.25 silicon, as a rule, and from $25 to $25.50, on 2.25 to 2.75 silicon. Owing to a lack of competitive tonnage of size, there has been no repitition of the $23.50 price recently done on the 1.75 to 2.25 silicon grade, or of the $24.50 price done on 2.25 to 2.75 silicon. Buffalo 2.25 to 2.75 silicon iron has been sold in this district at $23, and $24, furnace, but Buffalo foundry is not much of a factor in this district. Some Virginia foundry has been sold for shipment to New England, at the regular prices of $26 furnaces, for 1.75 to 2.25 silicon, and $27, for 2.25 to 2.75. Included in current inquiries is one lot of 500 tons of high silicon malleable otherwise, pending inquiries are small.

Demand Falling Off Noticeably

Pittsburgh, May 31.—May closed quietly in this district in the pig iron market and with only occasional spurts of inquiries and indefinite buying. The West Penn Steel Co. was reported to have closed on 500 tons of basic iron at a price lower than $23 delivered Brackenridge, Pa., but the order has been presented by a middleman to several producers at a figure lower than $21.50 valley, and it has been turned down in at least two instances. The seller apparently is having difficulty in developing a lower price than $21.50 valley which at the moment appears to be the minimum market, while some producers are holding to the $22 level. A Pennsylvania producer is quoting $21.50, furnace, with a freight rate to Pittsburgh of $1.82, thus giving the buyer the benefit of 14 cents per ton over the valley price. The Allegheny Steel Co. has not closed as yet on its inquiry for 1000 tons so far as reported. On bessemer the nominal price remains $24 valley but this practically is untested and undoubtedly tonnage business would develop a lower figure. Buying of foundry iron likewise has dropped off noticeably and only occasional small lots of 50 to 100 tons are purchased. The Mesta Machine Co. closed recently on 100 tons at $23 valley which appears to be the general market. An inquiry for 200 tons of malleable still is current and on this $24 valley is the lowest price quoted here. Some of the companies quoting $23 valley on No. 2 foundry iron (1.75 to 2.25 silicon) will not name that figure on single carloads, their price on the latter being $23.50 valley. Interest is high here over the low prices prevailing in the pig iron market since producing cost in many cases exceeds present selling prices. It is pointed out that even if ore is reduced $1 per ton to $5.55, the ore cost alone in one ton of pig iron is $13.16. This is arrived at by taking ore at $5.55 per ton, freight at $1.03 per ton, making the ore costs in the valley, $6.58 per ton. Coke at $3 per ton with a freight rate of $2.52 makes the cost of 1 1-5 ton, $6.62. Added to this is $1.50 for limestone and 50 cents for getting rid of the slag. This makes a total of $21.78 which does not take into account other costs.

Japan Wants Foundry Iron

Buffalo, May 31.—The biggest inquiry before the market is one for 1500 tons of foundry for Japan. This export business will probably be placed in England. The price seems to be well established at $24 to $25 with lower prices being done by foundries and brokers engaged in re-selling. Scattered inquiry is reported by one furnace interest of between 1500 and 2000 tons. The past week was featured by the sale of a few carloads of malleable at $24, furnace. Sales reported by one furnace interest for the past week totaled over 1000 tons.

Conditions Less Favorable

Cleveland, May 31.—Prospects in the pig iron market in this territory appear even less promising at present than they have recently. Inquiry remains light, shipping instructions show a tendency to taper off and prices which have been soft constantly, incline toward greater weakness. Current orders of size readily are attracting a price of $23 valley base or its equivalent and it is indicated this figure might be shaded on a specially desirable lot. Signs of the slowing down again of the automobile industry are being reflected in the demand for iron by manufacturers of engine castings. Mainly for this reason producers are looking for some reductions in their June deliveries. Total sales in the week were in small amount. One interest disposed of approximately 1200 tons, the largest lot included being 200 tons, on the $23 furnace base. The American Radiator Co. continues to make fair-sized purchases almost from week to week. It is reported to have closed during the past week for another lot of iron for Buffalo and Detroit plants totaling 1000 to 1500 tons. This company also has out a new inquiry of 300 tons of foundry iron for Springfield, O., and 200 tons for Titusville, Pa. A Barberton, O. consumer is inquiring for 500 tons of foundry iron. Local business is exceedingly meager and the furnaces find no occasion to change their $25 base quotation for Cleveland delivery which is practically nominal.

Sentiment Is More Cheerful

St. Louis, May 28.—For the first time in several months sentiment among sellers of pig iron is a little more optimistic. This feeling is not based on a heavy volume of actual sales, but on a decidedly better undertone to the market as a whole. Inquiries are more numerous and of a character indicating that those putting them out really want iron. Three of the largest stove interests in the district proper are operating on part time, and several of the smaller plants contemplate starting up in a limited way next month. Jobbing foundries report a slightly larger crop of scattered orders. Specifically about 400 to 600 tons of foundry iron were sold during the past week, and there is one inquiry for 500 tons of this grade, and several for smaller amounts. The Scullin Steel Co. purchased 500 tons of basic from a local manufacturer, the price being understood to be about $22.50 delivered. The Mt. Vernon Car Mfg. Co. has out an inquiry for 500 tons of basic. One important stove interest says it will require 4000 tons to carry through the balance of the year, which is about 50 per cent of normal consumption. A local manufacturer purchased 210 tons of foundry iron at Chicago on a basis of $21 furnace. Northern makers are offering at $22.50, and while the quotation of southern furnaces is still $23 for No. 2 foundry, (1.75 to 2.25 silicon), small tonnages have sold 50 cents under that figure, and $22 could be done for sizable quantities.

A Hope For Better Conditions

Birmingham, Ala., May 31.—Hope is expressed by makers that the new month will see a change for the better in the pig iron market though nothing beyond a few inquiries from outside of the immediate territory have appeared recently. Orders are still of one to two carlots at the time and deliveries are being made as quickly as product can be loaded. Occasionally orders for 100 to 300 tons of iron are received. A prominent independent company executive states that sales are not being sufficient to warrant the operation of the single blast furnace. The output for the month just closing will exceed the sales and melt. Quotations are given as $23 for No. 2 foundry (1.75 to 2.25 silicon), though

$22.50 would not be declined on sizable orders. While $21 has been heard of, no sales recently are admitted that low and it is denied that the tendency is toward a $20 base. Announcement is made that the car plant of the Chickasaw Shipbuilding & Car Co., at Fairfield, subsidiary of the Tennessee Coal, Iron & Railroad Co., will start operations this week and the plant of the Birmingham Stove & Range Co., manufacturers of stoves and hollowware, using 10 tons of pig iron daily, will resume Thursday after several weeks shutdown. Other iron and steel consumers of the district are scheduled to resume in the near future at a modified rate.

Coke Purchases Are Small

As Low as $3 Is Quoted on Furnace Coke While Foundry Brand Goes from $4.75 to $5

Pittsburgh, May 31. — Beehive furnace coke is being quoted as low as $3, ovens that being the minimum quotation received on recent inquiries by some eastern users recently entering the market. These have postponed buying due to the fact they doubt their ability to coninue in operation. They include an eastern furnace and the Thomas Iron Co., Hokendauqua, Pa. While $3.25 is more commonly the furnace coke quotation, two or three producers anxious for tonnage are quoting the $3 level. Some oven operators which now are inactive are holding to $3.50 ovens and higher. The recent purchase of the Robesonia Iron Co., Robesonia, Pa. consummated about three weeks ago involved 7000 to 8000 tons of coke and it is understood to have been closed at $3.60 or $3.75. Demand for foundry is considerably lighter and not so much is moving as in the early part of the month. The Washington Coal & Coke Co. announced new prices on foundry coke effective May 30 marking a decline of 25 cents per ton to $4.75 to jobbers and $5 ovens to consumers. Other offers of 72-hour selected foundry coke are being made as low as $4, making the market quotable at $4 to $5, ovens. Because of higher costs, some producers are maintaining levels in excess of $5 namely $5.25 and $5.50 for certain brands. For the most part these are asking prices and few if any sales outside of regular customers are reported. Production according to the *Connellsville Courier* for the week ended May 21 was 42,680 tons as compared with 43,290 the preceding week.

Market Without Change

Boston, May 31.—Improvement in coke orders reported a week ago has continued in a modified degree throughout the past week. One dealer reports a marked improvement in requests for delivery on old contracts. Another dealer reports a sale of 200 tons of beehive coke at $5.00 at the ovens or approximately $11.20 delivered. Scattered car-lot orders for byproduct coke are reported by several other dealers. The by-product prices are unchanged.

Sales Total Small

New York, May 28.—Sales of coke in this district during the past week apparently involved only a few hundred tons of foundry fuel. As a rule the prices done on spot beehive foundry coke range from $4.75 to $5.25. The northern New Jersey by-product coke maker continues to ask $5.50, Connellsville for May shipment.

Sales Are Restricted

Philadelphia, May 31.—Demand for coke is small and consequently sales are restricted to small lots. Demand for prompt foundry coke is bringing $4.75 to $5.25, Connellsville, depending upon the brand and analysis.

Market is Unchanged

St. Louis, May 31.—The coke market remains unchanged, except for the fact there is a growing inclination on the part of old customers to sound out the situation. These buyers are not putting out positive inquiries, but are seeking advice relative to buying. For the most part agencies are not advising quantity purchases. The belief is that more advantageous terms can be obtained later.

Offer Foreign Ore Low

Trans-Atlantic Material Available at 8 to 10 Cents Per Unit— Virginia Furnaces Consider New Source of Supply

New York, May 28.—Eastern pig iron makers have bought iron ore so far this year on an exceedingly limited scale and do not expect to place large tonnages for some time. This is for the reason that the stocks they carried over from last year have been ample to meet the reduced pig iron demand this year. While they are not interested in buying ore at this time, their plans for the future to some extent are hinged upon foreign ore. Prior to the war those eastern furnaces which are located close to tidewater always relied to a greater or less degree on foreign ore and they believe it is logical to assume that they again will use foreign ore in the future. The situation is especially interesting in this connection in view of the fact that freight rates in this country are high, while ocean rates are low.

In the absence of business to test the market the prices at which offerings have been made afford the only indication of the foreign ore market. It would be easy to buy high grade North African ore of bessemer quality, averaging 57 to 58 per cent, at 8 to 10 cents a unit, f.o.b. cars at eastern ports. Spanish and North African fine ores, averaging around 54 per cent iron and suitable for use in foundry and basic iron mixtures, can be had at 7 to 9 cents a unit, seaboard. Spanish low phosphorus ore averaging 53 to 59 per cent iron in the dry state has been offered at 11½ cents per unit at tidewater, based on a 10-shilling freight, but a lower freight rate than this now could be done. Swedish ore containing 67.50 per cent iron, with about 0.259 per cent phosphorus, probably could be had at not far from the price on the Spanish low phosphorus ore, excepting that the freight from Sweden probably would be at least 1 shilling higher.

These prices are figured on ocean freights ranging from 7 to 10 shillings per gross ton. While there is some difference of opinion, those interested in the subject are inclined to believe ocean rates will not advance noticeably for a long time. They believe present rates will be available on iron ore shipments for an indefinite period. This belief is based not only on the world shipping situation, but also on experience. The rates paid over the period 1909 to 1912, inclusive, ranged between 7s and 11s 6d.

Of the eastern furnaces which are logical consumers of foreign ore, those at Sparrows Point and Chester are located directly on tidewater. The freight rate on foreign iron from Philadelphia to Pottstown is $1.26, to Swedeland $1.12 and for the more distant furnaces as high as $1.54 and $1.68 per ton.

As contrasted with these rates the rate on iron ore from lower lake ports to Eastern Pennsylvania and New Jersey furnaces is $2.24 per gross ton. The rates from Port Henry to Eastern Pennsylvania and New Jersey furnaces range from $2.94 to $3.08 and the rates from New Jersey mines to eastern furnaces range from $1.68 to $2.24. It is likely these rates will be lowered as a part of the general reduction in transportation charges which is expected to materialize in the near future.

Of considerable interest in connection with the subject is that Virginia furnaces to some extent have begun to focus their attention on foreign iron ore. Foreign ore never has been used extensively in Virginia. These interests have suffered considerably recently from the high freight rates on domestic ore. The present rate on ore from lower lake ports to Virginia furnaces is $2.38 per ton. The rate on iron ore from Newport News and Norfolk to Virginia consuming points is $1.82. The rate on certain materials of an analagous character, however, now is $1.54, so that it is believed a lower commodity rate might be developed on iron ore from tidewater points.

Denies Price Cut

Cleveland, May 31.—Reports that a lake operator had disposed of a tonnage of ore at 75 cents under the present market quotation have been officially denied. This interest stated that it has made absolutely no sales and other interests state they have experienced the same situation so that the seasons' prices still are unsettled. Starting June 1 large operators in the Lake Superior district will put drastic curtailments of operations into effect.

Bar Demand Is Lacking

Backlogs on Mill Books Are Reduced as Demand Falls Off—Some Shading on Small Tonnages Is Reported

Chicago, May 31.—Almost entire lack of demand for soft steel bars has reduced backlogs on mill books, and practically nothing new is being contracted for at present. With railroads and agricultural implement makers taking nothing and the automobile industry doing much less than had been expected the usual market is practically nonexistent. Some shading has been done in quotations and some business has been booked at less than 2.48c. Chicago mill, but the entire tonnage in this class is too small to be regarded seriously.

After a short period of activity mills rolling bar iron have completed their orders and for the most part will be idle during the present week. While the quotation was held at 2.38c, Chicago, for some time, some sales were made a week or 10 days ago at 2.25c, Chicago, and more recently 2.18c, Chicago mill, has been quoted, and business booked at that rate. This is in line with quotations reported by mills further east.

Demand for hard steel bars rerolled from rails is lacking and this product is not moving. It is understood tonnage could be placed as low as 2.00c, Chicago mill.

Shipping Board Inquires

New York, May 28.—The biggest inquiry for steel bars before the trade here is one from the United States shipping board office at New York, calling for about 410 tons of ¾-inch bars. William P. Willets, in charge of purchases for the shipping board here, will open bids on this tonnage June 3. Current orders are as small as at any time in the recollection of the trade and are restricted to small quantities. All of the important sellers are adhering to the 2.10c, base Pittsburgh price, and the small eastern makers, who recently were quoting as low as 1.90c, base Pittsburgh, now name 2c, base, as the minimum. These interests do not appear to have booked any more tonnage during the past week than the makers who are quoting 2.10c. Inquiries are few and small and sellers who have canvassed the situation say there are no indications of an early improvement.

Orders are Small

Philadelphia, May 31.—Orders for steel bars are limited to small tonnages for prompt shipment and the total orders placed do not approximate a large volume. Eastern mills all are quoting 2.00c, base, Pittsburgh.

Order Accumulations Are Small

Pittsburgh, May 31.—Merchant steel bar producers are unable to accumulate much business and are not measurably increasing rolling schedules. This is due to the rate of buying, purchasers taking only what they need which usually is a carload or two at a time. A local jobber who has been offering bars at below 1.80c, base Pittsburgh, but who only has limited amounts of three sizes to offer, closed last week on a carload of regular bars at 2.10c, base Pittsburgh, which appears to be the usual mill quotation. Dullness in the refined iron bar market is reflected in the low rate of operating schedules of mills here. Few mills have their rolls engaged more than two or three days a week and the likelihood of increasing present operations in the near future seems remote. What few inquiries are coming out for this grade of bars continue light and in all cases the material involved is for quick shipment. The price of 2.75c, base, Pittsburgh, continues to apply.

Buyers Pare Needs

Pittsburgh, May 31.—Consumers of cold-finished steel bars continue to make purchases sparingly and in many cases are paring needs to the lowest possible point. Orders from automobile makers have fallen off considerably and very little new business from this source is coming to makers here. A local independent steel company recently received a number of orders for cold-drawn bars from the Cadillac Motor Co., Detroit, but the aggregate did not reach 100 tons. An inquiry from a Pacific coast user calls for a carload each of two sizes of hexagon bars. Many inquiries and orders, however, are for single carloads of assorted sizes, although orders for less than carload lots are frequently received.

Bolt and Nut Demand Is Reported Smaller

Cleveland, May 31.—A slight falling off is shown in orders for bolts, nuts and rivets, but on the whole makers report their plants are operating at about the rate for some time past. One maker of bolts and nuts reports that April's business was the best experienced so far this year and expects May's figures to slightly exceed those for April. Makers of bolts have been asked to bid on an inquiry for 1,000,000 bolts to be used in the construction of the proposed New York-New Jersey vehicular tunnel. It is understood bids are for estimating purposes only.

Rivet prices which had seemed stabilized on the basis of 3.25c Pittsburgh for structural and 3.35c for boiler rivets again are displaying some softness. It is understood some quotations are at $2 and $3 a ton under the previously lowest figure.

Sales Are Sluggish

Pittsburgh, May 31.—While little change is noted in the market for nuts, bolts and rivets, business appears to approximate between 25 and 30 per cent of normal. The inquiries put out recently by two eastern shipyards for 1,000,000 bolts to be used in the construction of the proposed New York-New Jersey vehicle tunnel, were for preliminary figures. No contracts for the tunnel have been let. Sales continue sluggish. Operation of factories in this territory is confined to three days a week. Structural rivets are quotable at 3.25c to 3.40c, Pittsburgh, and boiler rivets at 3.35c to 3.50c, Pittsburgh.

Shading on Bolts Reported

Philadelphia, May 31.—Shipyards which recently asked for bids on about 5000 tons of nickel steel bolts for the proposed New York-New Jersey vehicular tunnel, have asked bolt makers in this district to hurry quotations. Some shading on bolts has been reported here and small orders have been placed on a basis of 60 and 5 off compared with the regular quotation of 60 off.

Bolt Demand Is Smaller

Chicago, May 31.—Demand for bolts and nuts has been reduced to such a point producers are beginning to shut down their plants for entire weeks, orders not being sufficient to keep them going even at the reduced schedule which has prevailed recently. This condition results from general stagnation of manufacturing operations by those usually requiring large quantities of bolts and nuts.

Spiegel Sales

Reported at $31 Which Could Be Shaded—Ferroalloys Are Quiet

New York, May 31.—One or two carloads of spiegeleisen have been sold during the past week at $31, furnace, for 20 per cent metal. New inquiry is small. On a good-sized lot, $30 probably could be done. Ferromanganese, after the recent buying, is quiet, and the market is quoted at $77.50 to $82.50, delivered.

All ferroalloys are dull and show easy tendency in the absence of consuming demand. Ferrosilicon is steady at $80 to $82.50, delivered, nominal. Ten to 12 per cent ferrosilicon is quoted at $41, furnace, with little activity. Producers of ferrochrome of from 6 to 8 per cent carbon now is being quoted at 15 cents per pound contained, while the imported and resale alloy of the same varbon content is quoted at 14 cents to 14½ cents. Occasional sales of high grade ferrovanadium are reported around $6 and open-hearth alloy is holding at $5 to $6 per pound contained. Ferrotungsten is being quoted at 50 cents per pound contained although for importation foreign sellers have shaded 50 cents. Chrome ore is offered at $20 to $22.50 per ton f.o.b. Atlantic ports but there is no business. Spiegeleisen is selling at $29 to $30, furnace, on occasional domestic transactions. Foreign sales of this alloy are made more difficult by an increase in freight rates from New York to continental ports from $7 to $9.50 per ton.

Inquiries Not Always Orders

Pittsburgh, May 31.—While users ask for occasional carload lots, not much business is being done in ferroalloys in the aggregate. The Weirton Steel Co. is reported to have purchased 100 tons of English ferromanganese for delivery this month at around $75, delivered. The Weirton company so far as reported has not done anything with reference to its

150 tons for June. The Mesta Machine Co. as well as the Aluminum Co. of America have received quotations of $85, delivered, and lower on single carloads of American ferromanganese. Spiegeleisen is quiet and prices are soft. Practically nothing is being done in ferrochrome, ferrotungsten, etc., although some little activity was noted recently in connection with 50 per cent ferrosilicon.

Hold at $85, Delivered

Philadelphia, May 31.—While $77.50 to $82.50 delivered represents the ferromanganese resale market, first hands now are holding to $85 delivered.

Ferro Manganese Is Lower

Chicago, May 31—Decided weakening in the market for ferromanganese is apparent, a sale having been made recently of 100 tons at $80, delivered. This is the figure at which some business was done several weeks ago, after which quotations as high as $85 were current. Spiegeleisen is dull with no inquiry, eastern furnaces quoting $30 to $32.50.

Ore Offered Not Taken

Philadelphia, May 31.—The manganese ore market is untested. A cargo of off grade ore high in iron content recently was offered at 22 cents per unit tidewater but no sale resulted.

Valley Steelmakers Cut Operations Further

Youngstown, O., May 31.—Present dullness in the steel market has compelled independent steelmakers in the Mahoning valley to curtail open-hearth operation this week to 10 furnaces, this being but 20 per cent of capacity. The Trumbull Steel Co. and the Sharon Steel Hoop Co. are charging three furnaces each and the Brier Hill Steel Co. four.

Curtailment in sheet mill operations also became necessary due to the scarcity of business and this week the industry here is confined to 32 active mills representing 30 per cent of capacity. This is a loss of 4 per cent compared with operations a week ago.

Blast furnace operation continues at 18 per cent representing five stacks producing steelworks grades. The Youngstown Sheet & Tube Co. reduced its operations to the lowest point in many months if not years. The only active units at this company's plant this week are two blast furnaces and a rod mill.

On the other hand the Republic Iron & Steel Co. has increased operations by starting its bessemer plant, two pipe mills, two skelp, and three bar mills. The rate of pipe mill operation in the valley this week therefore, is 12 per cent of normal. The Sharon Steel Hoop Co., however, is operating its cold-rolled finishing department. Steel corporation finishing mills in this district continue at about 35 per cent. The Trumbull Steel Co. in addition to its open-hearth and sheet mill operation has four hot tin mills and its hot and cold-rolled strip department under power.

Plate Prices Weakening

Only Small Tonnages Involved in Reported Shading—Oil and Gas Tank Inquiries Before Market Total 6700 Tons

Philadelphia, May 31.—Only occasional plate orders, and these of small size, are being closed in this territory, but competition for this business is developing lower prices. Some tonnage during the past week went at 2.20c base Pittsburgh, some at 2.15c, some at 2.10c and some at 2.00c. The total represented was small. Current inquiry does not include any single item of importance. Eastern mills are operating spasmodically and the output is only a fraction of capacity.

Current Demand Quiet

New York, May 31.—Since the purchase of 1000 tons of plates by the American Locomotive Co. for use in the construction of 45 locomotives for China, current demand has presented nothing of interest. Sales of the past week have involved only occasional small lots, which have not been sufficiently attractive to bring out a price lower athan the regular 2.20c, base Pittsburgh, quotation. The American Locomotive Co. is understood to have paid between 1.75c and 1.85c, base Pittsburgh, for these plates, the concession being based on the facts that the locomotives are to be shipped abroad.

Tank Inquiries Out Again

Pittsburgh, May 31.—Bids again are being taken by the United States shipping board on fourteen 55,000-barrel tanks. This inquiry when formerly before bidders called for 12 tanks. This has caused the issuance of inquiries for approximately 2800 tons of plates and while reports of concessions on this product are heard, large plate users, both in Ohio and Pennsylvania, report inability to receive prices lower than 2.20c, base Pittsburgh. This price appears to be generally held by producers able to furnish sustained tonnage although job-lot sellers have been and are offering limited tonnages of plates for their stocks at concessions below the market. Other plate inquiries before sellers call for 200, 250 and 500 tons, respectively. The latter was put out as a slab inquiry but since it specifies a size 16 x 16 x ½-inch, and 0.85 to 1 carbon, it really is plates. Demand, however, generally is light and the Carnegie Steel Co. reports a slightly increased activity as regards specifications against old contracts. Two recent awards to the Riter-Conley Co., Pittsburgh, involved tonnages which doubtless will measurably increase those specifications. The United Gas & Fuel Co., Ltd., Toronto, Ont., has ordered a gas holder which involves 2400 tons and the Gulf Refining Co., Pittsburgh, has ordered eight tanks which will require 2500 tons of plates.

Softer Prices Are Reported

Cleveland, May 31.—Some reports are current of developing weakness in the plate market, and buyers in one or two instances report they have been able to place business materially below the 2.20c Pittsburgh base. One report indicated less than 2.00c had been done. However no tonnages of size which would thoroughly test out the situation are coming up for action.

Demand Entirely Lacking

Chicago, May 31.—Demand for steel plates is so small as to be negligible, and no class of users of this material is in the market for further supply. Even the small lots which can be relied on for some tonnages usually for construction of boilers and tanks, are lacking now and mills have nearly run through their accumulations in this product. Quotations remain firm at 2.58c, Chicago mill.

Tin Plate

Sales in Small Lots Only—Resales at $5 or Lower Are Heard

Pittsburgh, May 31.—What little business in tin plate is going is confined to small lots, duplicating the conditions prevailing in other steel products. This is true with tin plate, however, at a time when that industry should be booming, and the consensus of opinion among tin plate producers is that a huge demand is damming up which may engulf them during the last half. Practically the only active tin plate consumers are the packers of condensed milk. On production plates $6.25 per base box, Pittsburgh, is the price although on stock tin plate as low as $5.50 has been done. On some material originally intended for export, however, quotations of $5 and lower are heard. Ordinarily in busy times tin mills require approximately six weeks to produce tin plate on specifications, and while at present when the industry only is averaging 30 or 35 per cent of capacity considerable less time is necessary. To be on the safe side, it is said, users should be anticipating their June and July needs now to be assured of proper attention and delivery. Some mills are operating considerably more than 35 per cent of capacity and it is understood the Weirton Steel Co.'s tin plate department is working on approximately a 50 per cent basis. The New Castle and Shenango works of the American Sheet & Tin Plate Co. will increase their operations June 1, putting on 12 hot mills at New Castle and 20 at Shenango to be operated three days a week.

Hoop Demand Is Small

Pittsburgh, May 31.—Small tonnages of hoops and bands continue to move from time to time but demand is sporadic. Cooperage interests are not anticipating requirements and present inquiries involve 1000 tons or more at a time now are buying in single carload lots of assorted sizes. The market remains firm, however, at 2.75c, base Pittsburgh, except where extras for pickling, etc., are waived in an effort to stimulate purchases.

Scrap Inactivity Continues

Better Feeling Prevailing in Some Markets Not Occasioned by Any Increased Buying—Higher Prices Sought by Dealers

FOR COMPLETE SCRAP PRICES SEE PAGE 1552

Chicago, May 31.—Long continued buying of scrap by dealers to hold for higher prices has absorbed a large tonnage and storage capacity now is fairly well occupied and further absorption in this direction will be limited. As a result it is expected quotations may be definitely lower during June, as considerable scrap is likely to come out. Some buying of heavy melting steel has been done during the past week, but in small tonnages and at prices slightly above those now quoted. The buyers would have taken more had figures been more to their advantage. Some indication of lower prices is seen in slight declines on several items. Railroad offerings are slack at present, the Monon offering 700 tons and the other lists being small.

Cast Moves More Freely

Boston, May 31.—The demand for cast scrap continues to show a slight improvement although prices in many cases show softness. During the week an eastern Massachusetts consumer bought 300 tons of a special grade of No. 1 machinery scrap at $22 delivered. Another consumer bought two cars at $18.50 delivered and these two sales probably represent the range of the present market. A New Hampshire consumer who bought 100 tons several weeks ago has been in the market for another 100 tons at a price reported as close to $18.50 delivered. Small dealers watching declining pig iron prices are more inclined to dispose of their stocks than they were heretofore. Prices of other grades have not altered during the week and trading has been relatively quiet. Small orders for pipe, heavy melting steel and rerolling rails have been reported.

Holidays Add to Dullness

New York, May 31.—Recent dullness in the local scrap market has been accentuated by the holidays. Dealers, in many instances, did not open their offices on Saturday, and for a day or so preceding the influence of the occasion was reflected. Prices are nominally unchanged. Shading in some descriptions would be likely were there sufficient business to test the market.

Stronger Tone Develops

Philadelphia, May 31.—A stronger tone has developed in scrap. Holders want higher prices. Dealers now are offering $12.50 delivered, for heavy melting steel and are getting only small tonnages. Two consumers are offering $16.50 to $17 for low phosphorus scrap but dealers want more. Mills are paying higher for force and bundled sheets. Car wheels sold at $19. Several consumers are inquiring steel shafting and will pay $18 to $19 but dealers want $23 to $24.

Market Again is Sagging

Pittsburgh, May 31.—Lethargy again has settled in the scrap market after the little spurt caused by the entry into the market of a local steel maker, the purchases of which are estimated to be approximately 25,000 tons. This buying suddenly ended and while other companies were expected to follow the example, these expectations have not materialized. This, together with the stoppage of releases on the part of certain local users and others located in Canton and Massillon, O., have removed what strengthening factors were present in the market. Heavy melting steel today is off 50 cents per ton and is quotable at $13 to $13.50, while No. 2 railroad wrought has sagged to the same level. Machine shop turnings cannot be sold for more than $8.50. A few users would buy turnings, borings, etc., at prices unattractive to yard dealers and brokers to store against future needs but today's demand is away below normal. Dealers continue to buy for their yards, particularly from the railroads. These put out regular lists of varying tonnages. The Baltimore & Ohio list covering 22 carloads and the 11,755 tons of various grades of scrap closes today while the Pennsylvania lists, approximating 30,000 tons, will close June 1.

Market Movement Dull

Buffalo, May 31.—Hardly enough scrap material is moving in any grade to make a market. The price of heavy melting steel still appears to be $13, but the demand is not keen. There is some small movement of heavy cast scrap at $18, but the remainder of the market is all but lifeless. No local mills are at present in the market.

Delay Shipments Seven Months

Cleveland, May 31.—Trading in this district is the quietest it has been since the present slump began, according to dealers who point to the fact certain large consumers have issued orders holding up shipments on contract for the seventh consecutive month. Occasionally a dealer buys special grades to lay down in expectation of higher prices but this is the only activity apparent. Prices are unchanged.

Believe Stocks Are Low

St. Louis, May 31.—The feeling in scrap is better than formerly, though the volume of sales has not increased. Dealers believe that stocks in melters' hands are low, and that the first signs of returning business must be followed immediately by a rush to buy raw material. Yard interests are buying some scrap to lay down, mainly to keep their forces busy, as their stocks are not being drawn upon to any extent. Prices remain steady generally, the only changes in dealers' lists being in cast grades, which were advanced 50 cents a ton. Offerings from all quarters are light. There were no railroads before the market, but some small lots were sold via telephone bids. In this way the Missouri, Kansas & Texas disposed of about 400 tons, and the Cotton Belt 15 cars, prices on which were fairly satisfactory.

Southern Market Dull

Birmingham, Ala., May 31.—Exceedingly dull is the southern scrap market. No new business is being announced except an occasional small tonnage for immediate delivery. Delivery is reported to have been resumed on some old contracts, consumers taking the product purchased some time ago at prices higher than now exist. The scrap dealers do not look forward to any immediate improvement. Some expect a better demand when pig iron sales are active. All scrap quotations are weak and where any purchasing is done the consumers are fixing the price.

Pipe Markets

Are Quiet—Both Cast and Welded Demands Are Inactive

Pittsburgh, May 31.—The market for tubular goods has become more quiet during the past week or so, today's demand being easily satisfied. Both inquiries and orders have dropped off and most of the latter are for single carloads, many calling for assorted sizes. A slight improvement in the demand for standard merchant pipe is noted, betokening interest on the part of the building construction industry. What is hoped to be only a temporary lull is noted in connection with line pipe, superinduced by the slump experienced in the oil industry. The tendency among line companies is not to increase operations but to await an advance in the price of their product. Another cut in the oil price last week practically wipes out recent advance. While some of the pipe mills here are running at practically 40 per cent of capacity, others are down to 25 per cent.

The month of May for manufacturers of wrought iron pipe is expected to equal if not exceed January. That month is the banner month of the year so far in point of sales. February dropped to a negligible amount but since that time a steady improvement has been noted. This betterment has been contributed to by small orders for various types of tubular goods.

Price Tendency Downward

New York, May 31.—No new municipal inquiries are current and the eastern cast iron pipe market generally is unchanged. However, there is a downward tendency in prices which may result in a lower market shortly. No award has yet been made by the city department of water supply of the 1800 tons recently reported.

Demand Falls Off

Youngstown, O., May 31.—Demand for both lapweld and buttweld pipe has fallen off considerably as evidenced by the low operating rate of mills here this week. Only 12 per cent of capacity in the valley is engaged. It is understood the Statler hotel interests have closed on their requirements for 12, 14 and 16-inch pipe which they desired for foundation purposes. The inquiry

called for approximately 15,000 feet or about 1200 tons.

Prices Decline Further

Chicago, May 31.—Quotations on cast iron pipe are assuming a definitely lower level, and the present nominal figure of $55, Birmingham, seems to have been abandoned by all makers. Shading is generally down to $45, base Birmingham, and some lots have been placed at even lower figures. The American Cast Iron Pipe Co. has been awarded 500 tons at St. Paul, 500 tons at Sauk City, Wis., and 350 tons at Janesville, Minn. The National Cast Iron Pipe Co. has taken 400 tons at Casper, Wyo., and 500 tons at North Platte, Nebr. The United States Cast Iron Pipe & Foundry Co. has been awarded 200 tons at Cambridge, Minn. Detroit opened bids May 27 on 5000 tons. Soil pipe has been reduced again and is now quoted at $32.50, base, Birmingham, which is about the level of 1914.

Some Warehouse Prices Are Readjusted

Philadelphia, May 31.—Leading jobbers have readjusted prices on certain steel products out of stock. These readjustments are in the form of reductions to bring these stocks in line with other prices. The reductions are 40 cents per 100 pounds on steel hoops, 3 cents per 100 pounds on 3/16-inch plates, and 25 cents on black sheets and 25 to 50 cents on galvanized sheets. The new figures are 3.85c on hoops, 3.52c on 3/16-inch plates, 5.00c on No. 28 gage black sheets, and 6.00c on No. 28 gage galvanized sheets. Prices on other products are unchanged. Out-of-town prices on most products now are arrived at by subtracting 10 cents from the local delivery prices, and adding the freight from Philadelphia to destination. The only differences are in the case of cold rolled steel, where 25 cents is subtracted from the Philadelphia local delivery price, and in tool steel, Norway iron and toe steel, in which the prices for out-of-town shipments are the same as those for local delivery. Current demand is of a spasmodic character. Soft steel bars are most in demand.

Prices are Unchanged

New York, May 31.—Quotations in the local warehouse market are unchanged. Jobbers assert present mill prices do not warrant a further reduction, and little would be gained by such a move, as consumers have relatively few requirements. At the same time, these latter interests, it appears, are looking for a further downward revision in mill prices in the near future, and consequently are moving with considerable hesitancy.

Demand is Fair

Cleveland, May 31.—Demand for iron and steel stocks out of warehouse continues at a fair rate. Prices are holding at the levels established some time ago and there is no shading reported. The strike in the building trades which has tied up more than $25,000,000 of construction in this district, is now being felt by jobbing interests, although the decrease in business is not marked.

Sheet Orders Declining

Automotive Industry Fails To Buy—Ford Motor May Shut Down — Dull Summer Expected—Prices Generally Are Being Maintained

Pittsburgh, May 31.—Among independent sheet producers considerable falling off in automotive demand is noted. Sizable specifications, however, continue to be received by the American Sheet & Tin Plate Co. from these sources. For the most part these specifications are fragmentary and only represent needs on which immediate shipment is desired. In the automobile business generally, however, nothing is planned beyond June 3. Various reports are current regarding shading under the market prices of 3.10c, 4.00c and 5c on blue annealed, black and galvanized sheets, respectively, but so far as reported the only concessions available in this district are made of certain limited stocks in the hands of small jobbers who have to liquidate them. Buyers report that the mill prices are generally adhered to. Other industries outside of the automobile trade continue to take only limited tonnages of sheets in accordance with their needs.

Expect Dull Summer

Philadelphia, May 31.—The past week was the quietest yet in the sheet market here. A number of orders were placed but they were only in small lots. The sheetmakers generally say there is no indication of improvement and are now looking forward to one of the dullest summers on record, with some prospect of improvement around September. All sheet prices are being maintained.

Ford May Shut Down

Youngstown, O., May 31.—No active improvement in the sheet market here is noticed. Business still is confined to orders calling for bundled lots. While many makers state they are adhering to 4.00c for black, 3.10c for blue annealed and 5.00c for galvanized yet a few makers report having heard definite'y that black have been quoted by one valley mill at $3 a ton under the market. The fact that so little business is coming out has led most makers to stick to present quotations. They feel that to shade prices now would have little effect of stimulating buying, recent experience showing little profit can result by a further continuance of the policy. Sales of automobile sheets continue to lag, with pleasure car makers specifying close to their requirements. According to well founded reports the Ford Motor Co. has posted a notice it will close down its plant indefinitely beginning July 1.

Demand Dull in West

Chicago, May 31.—Demand for steel sheets is at a low ebb, and mills are operating at only a fraction of capacity, while consumers have little need for material, as their business is small. For the most part prices are being maintained and less shading is being done than usually is the case when business is slack. Automobile builders are not living up to their expectations in production and fewer sheets are being required.

Strip Purchases Small

Pittsburgh, May 31.—Real improvement still is lacking in the strip steel market only spasmodic purchases of single carloads keeping it alive. More often less than carload lots are specified but these are not numerous. Notwithstanding this fact however producers here are holding strongly to the 2.75c and 5.50c base Pittsburgh price on hot and cold-rolled respectively. Demand from the automotive industry appears to be not so well sustained as makers hoped for although occasionally other industries have come to the front with limited tonnages. An electrical company in this district sent its order to one of the local mills for a fair-sized tonnage this past week and occasionally a toy or hardware manufacturer buys a small lot. Operations continue on a basis of 25 or 30 per cent of capacity with not much hope held off for improvement, until after the matter of freight rates has been adjusted. A few inquiries are received almost every day, but some of the orders placed are not preceded by inquiries coming from regular customers who are familiar with the prices.

Wins Week's Delay in Basing Point Case

Washington, May 31.—The United States Steel Corp. has obtained from the federal trade commission an extension of a week for the filing of its answer in the Pittsburgh basing point case. Originally, today was the deadline for the filing of this reply and it was expected the commission would take steps looking toward the taking of testimony in such centers as Pittsburgh, Chicago, Duluth and Birmingham. This has now been delayed at least a week and possibly longer, as usually several weeks elapse between the final date for the reply and the actual taking of testimony.

Operations Unchanged

Chicago, May 31.—Steel mill operation this week is unchanged from last, the Illinois Steel Co. operating 10 of its blast furnaces and about the same proportion of finishing mills, a percentage of about 32. Inland Steel Co. will be active to about 25 per cent of its capacity. Interstate Iron & Steel Co. continues at practically the same rate as last week.

Issues Can Price List

New York, May 31.—The American Can Co.'s list of prices on packers' cans is as follows: No. 1 standard sanitary cans, $19.50; No. 2, $27; No. 2½, $34.75; No. 3, $36.50; and No. 10, $79, all f.o.b. shipping point. The prices have been in effect since April 20.

Structurals Mark Time

Building Conditions Now Seem Dependent on Settlement of Trades Strike—Detroit Bridge Again Bid—1.90c Steel Indicated

Cleveland, May 31.—On revised bids on 3050 tons for the Belle Isle bridge, Detroit, the Wisconsin Bridge Co. is low with a tender of $114 per ton for the material fabricated and erected. It is figured by some steel makers that this indicates a plain material price around 1.90c Pittsburgh, which however may be under an old protection since this particular contract has been pending for some weeks. A railroad bridge at Cincinnati for the Chesapeake & Ohio will require 1600 tons. Revival of bids on 400 to 500 tons for a branch of the Cleveland Trust Co. apparently is the only development of interest in the local market. Several sizable jobs on which bids have been taken including the 1400 tons for the Kelly Island Lime & Transport Co. extensions are yet to be placed.

Shape Buying Restricted

New York, May 31.—Structural activity continues greatly restricted. Few orders or inquiries of importance are reported and it is being freely predicted the business of the past month was under that of April 1. Some fabricators extend this further and predict little improvement before fall. Shape prices are unchanged.

May Orders Below April

Philadelphia, May 31.—Orders for structural shapes in May are estimated as being 50 per cent of the April total. New orders are scarce and part of the tonnage coming in is at 2.00c, base Pittsburgh, where protection was granted prior to the advance of April 13. Mills are not taking any new business under 2.00c, base Pittsburgh.

Sheet Piling Wanted

This is for 1000 tons of sheet piling from a local company.

Buffalo, May 31.—The construction business has improved somewhat and there is at least one good inquiry out.

Scattered Small Jobs Awarded

Pittsburgh, May 31.—Numerous small shape orders coming to the mills reflect the now general report among fabricators that generally only small repair jobs are being made. Often these involve pounds instead of tons but are considered indicative of a healthy undertone in the market and while larger jobs are held in abeyance these small awards are enabling partial operation of the mills, tiding them over until the more sizable ones are placed. One prominent steel maker reports it practically has been swamped with opportunities to figure on jobs involving from one to 100 tons in the past two weeks. One typical case is a bridge at Beaumont, Tex., which involved 4021 pounds. Complications with the city planning commission at last have been ironed out and the steel for the Bell Telephone Co.'s building, this city, 300 tons, will be furnished by the Jones & Laughlin Steel Co. Structural material generally is held at 2.20c, the low prices appearing in connection with awards, below $70 per ton for fabrication.

Little Building This Season

Chicago, May 31.—Although indications are the present deadlock between the building trades and employers may be settled within a short time, the general opinion is that building has been effectually blanketed for this year. Producers of structural material are not looking forward to a rush of business. Among tonnages placed recently none is of much size, and they do not represent any forward movement. Prices are generally firm at 2.58c, Chicago mill.

CONTRACTS AWARDED

Building for the Bell Telephone Co. at Highland avenue, Pittsburgh, 300 tons to the Jones & Laughlin Steel Co.

Gas holder for the United Gas & Fuel Co., Ltd., Toronto, 2400 tons of plates to the Riter-Conley Co.

Eight tanks for the Gulf Refining Co., Pittsburgh, 2500 tons of plates to the Riter-Conley Co.

Five highway bridges at Glenwood, Iowa, 162 tons, to Omaha Structural Steel Co.

Edward Beck apartment building at Powell, Cal., 150 tons to Judson Mfg. Co.

Beaver Reserve Fund building, Madison, Wis., 108 tons, to Worden-Allen Co.

Theater, San Francisco, 600 tons to Judson Mfg. Co.

Masonic temple, Danville, Va., 700 tons, concrete construction adopted.

CONTRACTS PENDING

Towers for Pacific Gas & Electric Co., 1500 tons, bids opened.

Branch bank, Cleveland Trust Co., Cleveland, 400 to 500 tons, bids in.

Work for the United Engineering & Foundry Co., Pittsburgh, 240 tons, bids being taken.

Bridge over the Lehigh Valley river at Bethlehem, Pa., bids to be taken until June 30 on several hundred tons.

Belle Isle Bridge, Detroit, 3050 tons, Wisconsin Bridge Co. low bidder.

Bridge for Chesapeake & Ohio railroad, Cincinnati, 1600 tons, bids to be taken June 3.

Bridge work for Central railroad of New Jersey, 700 tons, action postponed.

Building for First National bank, Fort Wayne, Ind., 500 tons, bids being taken.

Extensions for Great Northern Paper Co., Millinocket, Me., 600 tons, bids being taken.

Towers, Annapolis, Md., 600 tons, bids being taken by bureau of yards and docks.

Reinforcing Bar Prices Showing Softness

Cleveland, May 31.—The general contract for the Baldwin reservoir this city, finally has been awarded to the Hunkin-Conkey Construction Co. of this city, but the reinforcing steel, about 1750 tons is yet to be placed. Indications are that this tonnage will be keenly competed for, as prices on both rerolled and new steel bars are softening. Rerolled bars have been sold in this territory at 1.85c mill and 1.90c has become a more or less open quotation. On new steel bars it is reported that 2.00c Pittsburgh with the waiving of the deforming extras has been named. Plans for the new Ohio stadium of the Ohio State university, Columbus, will be received around the middle of the month.

New Work Increases

New York, May 31.—While there was a dearth of important lettings in the concrete reinforcing bar market in this district during the past week, the amount of new work which is coming up for bids has increased. General contracts for numerous construction jobs have been let and bids are going in on an even larger number of projects. Prices have shown a tendency to stiffen. A good many orders for mill shipment have been placed during the past week at 2.00c, base Pittsburgh, which were subjected to competitive bids, and it is scarcely likely that the buyers would have placed these tonnages if a lower price had been obtainable. Sellers recently were doing as low as 1.85c, and 1.95c, base, stating that their minimum figure now is 2.00c, base Pittsburgh. The usual price on concrete bars out of stock here is 2.50c, base, Pittsburgh.

Concrete Bar Demand Sluggish

Pittsburgh, May 31.—Only a spasmodic demand for reinforcing concrete bars is noted. One typical order received by a large independent producer recently called for 50 tons. Those manufacturers who roll from new steel meet keen competition from the rerollers who are offering bars as low as 1.75c, base Pittsburgh. Small sales of rerolled bars have been made from that level to 1.95c. The price on new bars, however, is 2.10c, base Pittsburgh, with the usual extras for size but some manufacturers are waiving the extras for deforming and twisting. Bidders on the "hill-to-hill" bridge over the Lehigh river at Bethlehem, Pa., will file bids before noon, June 30, for the building of a complete bridge or its component parts, with the office of the public service commission at Harrisburg.

CONTRACTS AWARDED

Baldwin reservoir, Cleveland, 1750 tons, general contract awarded to the Hunkin-Conkey Construction Co.

CONTRACTS PENDING

Bridge at Oyster Bay, N. Y., 100 to 125 tons bars, general contract to P. T. Cox Contracting Co., New York.

Bridge at White Plains, N. Y., 100 tons bars, general contract to P. J. Cogan Contracting Co., New York.

Building in Brooklyn, 100 tons bars, general contract to Gretch Engineering Co., New York.

Warehouse at Bridgeport, Conn., 200 to 300 tons bars. Bids being taken by Lockwood Greene & Co.

Bridges at Mount Vernon, N. Y., 100 tons bars. Bids asked.

Hospital at Hartford, Conn., 150 tons bars, bids being taken.

Jewish home at New Haven, Conn., 100 tons bars, bids being taken.

Newark Athletic Club building, Newark, N. J., 300 tons bars, bids being taken.

Warehouse for Topping Bros., New York, 300 to 400 tons bars, general contract to White Construction Co., New York.

Cornell university laboratory, Ithaca, N. Y., bids being taken.

Library building, Jersey City, N. J., 100 tons bars, general contract to Hageman Harris Contracting Co.

Car Buying Low

With Some Taking of Spikes in May—Inquiries Only Fair

New York, May 31.—Small, scattered orders comprised buying in the car market during the month ending today, and in the aggregate did not involve more than 275 freight cars, as compared with 425 in April. Inquiry involved about 2700 cars, of which 1600

are through the Wah Chang Trading Co., 233 Broadway, for shipment to China. Outstanding among domestic inquiries were 500 coal cars for the Pittsburgh & West Virginia railroad. Inquiries in April aggregated 2400 cars.

According to the regular monthly statement of the Railway Car Manufacturers' association, 5326 freight cars were delivered in April. Of these, 4455 were for domestic service and 871 for foreign. The total compares with 6453 in March, 6276 in February and 7827 in January.

Freight cars on order and undelivered April 30 totaled 20,825, of which 3312 were for foreign account. Car repairs aggregated 11,884.

The Atlantic Coast line wants 3000 tons of tie plates. The Pennsylvania railroad's third inquiry for approximately 2250 tons of tie plates, still is active. The New York Central is inquiring for 125,000 track bolts. These inquiries embrace practically all the railroad orders which are current in this district at this time for this class of material.

Tie Plates Are Placed

Philadelphia, May 31.—The Pennsylvania railroad, after putting out an inquiry several times has placed 1800 tons of tie plates. The tie plate market is around 2.50c Pittsburgh. Light rails rolled from new steel are around 2.20c Pittsburgh and rerolled rails considerably lower, in some casese under 2.00c. The total business is small.

Orders Limited To Needs

Pittsburgh, May 31.—Current business in light rails is poor and buyers are limiting orders to actual requirements. The price holds firmly to 2.20c, base Pittsburgh, however, although on rerolling rails lower levels prevail. One order to a large independent producer last week involved 300 tons from the Cincinnati district, for a coal mining company. This industry, particularly in Kentucky, West Virginia and Pennsylvania, continues to inquire for fair sized lots of light rails. Present demand for relaying rails has dropped off considerably although the market remains quotable at $32 to $35, Pittsburgh. It has become more difficult

Requests for spike prices continue to be filed by railroads although in this district orders still are held in abeyance. The Missouri-Pacific which inquired for 2000 kegs is understood to have closed upon its partial requirements at less than $3.25 per 200-pound keg. The Pennsylvania has put out an inquiry for 500 kegs. Spikes are quoted at $3.25 to $3.40, base Pittsburgh, per 200-pound keg, some producers naming the latter as a flat price on all sizes of spikes. So far as reported the Big Four has nto closed on its inquiry for several hundred thousand tie plates. These are quoted at 2.50c, base Pittsburgh.

Expects Roads to Buy Soon

Chicago, May 31.—Railroads are holding back buying and probably will not be a factor in the market until after the wage situation has been settled definitely. Railroad stocks are almost depleted, it is said, and some small buying is being done always for immediate delivery. No more rails will be bought for 1921, and roads are having deliveries held up because requirement programs have been delayed

German Sheet Bars Sold

Small Lots Taken at $34 Eastern Seaboard—Specifications in Smaller Volume—Prices Yet To Be Tested

Pittsburgh, May 31.—The demand for semifinished materials practically has disappeared. Occasionally inquiries for sheet bars, forging billets, skelp or wire rods become current but these are all for small quantities and relatively are unimportant as market factors. Sheet bar inquiries involve from 50 tons up and on these $39, base Pittsburgh, has been quoted. A few single carload inquiries for forging billets failed to bring out a price lower than $42, base Pittsburgh, while a large independent producer reports that it failed to take an order for 300 tons of skelp on its quotation of 2.20c, the buyer claiming to have a 2.10c, base Pittsburgh, price. One recent inquiry for nail wire rods involved 500 tons and on this $48, base Pittsburgh, was the general quotation.

Several sellers report absolutely no demand for rerolling billets or slabs. The 4 x 4-inch billet quotation of $37 remains firm here in the absence of business as does the $39 quotation on the smaller sizes. Without doubt tonnage business would develop keen competition which would mean lower levels.

Some Carload Sales

New York, May 28.—Sales of semifinished steel in this district apparently have been restricted to a few carloads of open-hearth rerolling billets during the past week. This business was done at $37, base Pittsburgh. Sellers report there are no indications of an early improvement in demand.

No Orders Placed

Philadelphia, May 31.—Orders for semifinished material are entirely lacking and while some inquiry has come out of late, this is not regarded enthusiastically. The market is unchanged but prices are entirely nominal.

German Sheet Bars Sold

Youngstown, O., May 31.—Little change in the semifinished market is apparent. Sheetmakers having contracts for sheet bars are paring their specifications to absolute requirements and their business represents only small lot tonnages. No evidence exists as far as can be ascertained, of any sheet bars being placed with mills here under $39, Youngstown. It is stated freely, however, that foreign tonnages of sheet bars principally from Germany, are being laid down in New York at $34 and that some tonnage at this figure has been absorbed. Little demand exists for slabs or billets. The Cleveland Welding Co., which recently was in the market for 200 tons of skelp, is understood to have closed for this business with a maker in a nearby district at a price slightly under present quotations.

Rerolling Mills Elect

At the meeting of the Rail Steel Products association, which includes the leading rerolling mills of the United States and Canada, held at the Baltimore hotel, New York, May 27, the following officers were elected: E. E. Hughes, vice president of the Franklin Steel Works, president; D. E. Sawyer, sales manager of the Pollak Steel Co., Equitable building, New York, secretary; and Arthur S. Hook, vice president of the Calumet Steel Co., Chicago, treasurer.

$5 Reduction

Named by Independent Mills on Wire Products—Rods Unchanged

Cleveland, May 31.—Various independent producers of wire products now are quoting at $5 per ton reduction, bringing plain wire to $2.75, Pittsburgh and wire nail to $3.00, Pittsburgh. Up to the last day or two, only nails had been cut to this amount by some interests. Now the reduction is being applied to all wire products and by practically all producers. The reductions have brought out little new business yet. Rods have been unaffected and remain at $48, Pittsburgh.

Consumers Taking Less

Chicago, May 31—Consumers of wire and nails are not taking as much material as during the past few weeks and business is coming to mills in small lots, all of which is desired. Consumers apparently have no confidence in present prices and desire to take only what they can use at once and not keep any on hand. Some reports are current of wire and nails being shaded to the extent of about $5 per ton, but this is not verified.

Market Is Weakening

Pittsburgh, May 31.—The condition in this market as regards wire and wire products is reverting to that which applied prior to April 13. A competitive market again is introduced, particularly on nails, barbed and galvanized wire. Some of the independent companies are openly quoting 3.00c on nails, 3.85c on galvanized barbed wire, 3.15c on painted barbed wire and 3.45c on galvanized wire, a decline of $5 per ton. The American Steel & Wire Co. maintains prices on these four products at 3.25c, 4.10c, 3.40c and 3.70c, base Pittsburgh, respectively. With the exception of nails, however, not much business is going on which to compete. The nail demand from jobbers is fair, from one to several carloads at a time being moved. One producer reports the receipt of orders for nails at the rate of three or four cars per week. One recent inquiry for galvanized wire involved 300 tons but most orders for wire placed recently called for lots of two to five tons, with an occasional carload.

Sales of Deere & Co., for the fiscal year ended Oct. 31, 1920 gained 15 per cent over the preceding year but owing to large increases in the cost of materials and labor the net income was reduced by $609,495. Net earnings of the company after preferred dividends were $2,197,717 against $2,805,177 in 1919.

The Nonferrous Metals

Copper Strong While Rest of Metals Are Weak, and Most Show Little Change in Price

	‡Copper	Spot Straits New York	†Lead New York basis	Zinc St. Louis basis	Spot† aluminum	Spot antimony	Nickel shot
May 25	13.12½	32.45	5.00	4.75	24.12½	5.30	40.00
May 26	13.15	32.12½	5.00	4.75	24.12½	5.30	40.00
May 27	13.12½	32.00	5.00	4.75	24.00	5.25	40.00
May 30				Holiday			
May 31	13.12½	31.37½	4.87½	4.72½	22.75	5.25	40.00

‡Outside market, refinery.
†Open market quotation.

NEW YORK, May 31.—Copper was the one strong metal in the nonferrous markets during the past week. Copper's strength was the more surprising in the face of declining export business and continued light domestic demand. Pending exports expected to develop in fair volume soon constitute a strengthening factor.

Producers are now holding firmly at 13.50c, delivered, which it would be difficult to shade in the present market. In the outside market, sales have been made at 13.25c, Connecticut valley.

Zinc is steady at 4.75c, East St. Louis, and 5.12½c New York. These prices are about ¼c under those prevailing two weeks ago. The statistical position of zinc showed improvement in April, with a decrease in stocks reported for the first time since June, 1919. Shipments to consumers also gained about 5000 tons as compared with March. Despite the recent decline in sterling exchange, the parity is still below London and export offers are not material.

Lead shows an easier tendency, especially for spot and June shipments which are down to about 4.75c, East St. Louis and 5c, New York. This is a decline of about ¼c in the outside market. London quotations are down along with exchange, but foreign parity is still too high.

Tin shows weakness with prices nominally following London quotations and fluctuating exchange rates. Sales on this side are few and consumers show little interest in the market. London prices have sagged during the last few days. Spot Straits and futures in New York are nominally 31.25c to 31.50c.

One of the outstanding features of the week was the advance of ¾c a pound in copper products. Brass products remain at the reduced prices of a week ago. The advance was due chiefly to the strength of the metal market, for rolling mills have shown no improvement in the rate of operations. Even the demand for copper wire has been dull.

The aluminum market is feeling the effects of declining activity in the automobile industry, while consuming demand for other uses also remains quiet.

Mill Products

SHEETS	
Copper, hot rolled, 24 oz., minimum	21.25-21.50
High brass	16.25
Zinc, ga. 9 to 18 (plates ½c less)	10.00
Lead, full sheets (cut @c more)	8.25
SEAMLESS TUBES	
High brass	20.00
Copper	22.00
RODS	
High brass, round, ⅜ to 2½ in.	14.25
Naval brass rod	17.25
WIRE	
Copper	15.00-15.75
High brass	17.25

Dealers' buying prices on old metals follow:

Old Metals

HEAVY RED BRASS		
Chicago		8.50
Cleveland	9.00	9.50
New York	9.50	9.75
HEAVY YELLOW BRASS		
New York	5.25	5.75
Chicago		6.50
Cleveland	5.50	6.00
ZINC		
New York	2.75	3.00
Cleveland	2.50	3.00
Chicago		2.75
HEAVY COPPER AND WIRE		
Cleveland	9.50	10.00
Chicago		9.50
New York	9.25	9.75
RED BRASS TURNINGS		
New York	7.00	7.50
Cleveland	7.00	7.50
Chicago		7.50
YELLOW BRASS TUBING		
Cleveland	5.50	6.00
NO. 1 BRASS ROD TURNINGS		
Cleveland	4.50	5.00
New York	5.00	5.25
Chicago		5.25
ALUMINUM BORINGS		
Cleveland	6.50	7.00
Detroit	6.00	7.00

Demand Better

For Refractories But Is Still Small—Railroads Do Some Buying

Pittsburgh, May 31.—Actual requirements in refractories continue to be the only orders received since under curtailed operations consumption is at a low point. Some slight improvement is reported by a few sellers who have received minor inquiries or who are booking a few repair orders. These involve from 100,000 to 400,000 fire clay brick for open-hearth ladle linings. Inquiries and orders for silica and magnesite as well as chrome brick call for fair sized lots and one typical order for silica brick placed recently involved 250,000. Prices on magnesite and chrome have dropped $5 and $10 per ton, respectively; some companies now are quoting $75 on magnesite and $60 per net ton on chrome.

A representative order for open-hearth purposes calls for 60,000 checker brick for gas or air heating, 10,000 for immediate delivery, 10,000 a little later and the remainder to be specified against indefinitely. This practically is the character of all orders received at the present time. Current buying indicates the limited stocks on hand.

Some of the railroads are buying a carload or two of brick at a time for boiler settings or for forge or furnace purposes. This is taken as an encouraging sign since for some time prior to May 15 there was no buying at all of this character. Bricks for the glass industry continue in fair demand but during the past week prices were reduced 10 or 15 per cent.

Fire Clay Brick

(Per 1000 f.o.b. works)

Pennsylvania, No. 1	$36.00 to 43.00
Pennsylvania, No. 2	30.00 to 35.00
Ohio, No. 1	36.00 to 40.00
Ohio, No. 2	30.00 to 35.00
Illinois, No. 1	40.00 to 45.00
Illinois, No. 2	30.00 to 40.00
Kentucky, No. 1	36.00 to 40.00
Missouri, high grade	40.00
Missouri, No. 1	35.00
Maryland, No. 1	40.00 to 55.00
Maryland, No. 2	36.00
SILICA BRICK	
Pennsylvania	$35.00 to 40.00
Chicago	42.00 to 45.00
Birmingham	50.00 to 56.00
MAGNESITE BRICK (Per Net Ton)	
9 x 4½ x 2½	$75.00 to 80.00
CHROME BRICK (Per Net Ton)	
9 x 4½ x 2½	$60.00 to 70.00
BAUXITE BRICK (Per Net Ton)	
9" straights, 55 per cent.	$50.00
9" series shapes, 55 per cent.	55.00
9" straights, 76 per cent.	90.00
9" series shapes, 76 per cent.	95.00

Financing Chinese Export Orders

Contract Signed with the Orient for $4,000,000 of Railway Materials—American Bankers Will Attempt Liquidation Scheme in South America—Railways May Re-Establish Special Export Rates on Steel

NEW YORK, May 31.—While some significant business has been done in the export iron and steel market this generally has been based upon the ability of the exporters to finance the undertakings. It was in this manner the recent large Chinese rail order was placed. This order means the ultimate purchase of about $4,000,000 in railway materials in the United States by the Chinese department of communications. Chinese indentures, bearing a fair rate of interest are to be taken and the agreement was signed by the Universal Steel Export Co., 26 Cortland street, New York, and was consummated by that company in conjunction with the Hua Sheng Trading Co., of Shanghai.

The Chinese transaction is but one of a few which promise to revive export trade. Bankers now are looking with more favor upon such trading and it is expected there will be more liberal treatment on their part. Such a prospect was foreshadowed last week by a conference with the President at Washington.

While the banks may be persuaded to go to greater lengths than they have to assist exporters to get orders, it is not believed they will be inclined to take chances on Europe for some time yet. There is a growing conviction some orders might be brought out of South America, and the bankers have been called into conference on this. It was proposed, at a meeting of exporters and bankers, that the American-owned surplus stocks in South American ports be pooled and liquidated under the direction of a single receiver.

The Chilean railway bids have been postponed until August, according to word received here. Chile will ask for 12,000 tons of rails. The American bids offered on the Argentine inquiry for 10,000 tons of rails were high. Belgium, it has been learned submitted prices much below American figures.

Mexican business is recovering and negotiations are under way to have the Obregon government recognized by the United States. A representative of the Mexican railways system, who has been in the United States for the past week or so, is reported to have purchased 40 secondhand locomotives. He is said to be inquiring for 92 locomotives in all. This representative is also said to be in the market for a number of passenger cars. Payments are offered upon the deferred plan.

The Universal contract is not the only important development in the Chinese market. It was learned last week that the Pekin & Mikden railway has ordered 4000 tons of rails of the United States. This is a general equipment order which is usually placed about this time of the year. There is also Chinese inquiry in the market for 2600 tons of heavy rails. Various miscellaneous supplies are being sold to China among which was 300 tons of wire shorts.

In view of the opportunities to sell steel abroad a movement was reported on foot to have the railroads establish a special export rate on such commodities. It is said rail traffic officials are in favor of the plan.

Strike on Coast

Affects Steel Markets—Dullness Prevails in Nearly All Grades

San Francisco, May 28.—Continued dullness features the local iron and steel market. At present there is little in the way of a revival of buying to encourage trade. Buyers still are showing very little interest in offerings and profess to have no real need for supplies.

The lockout put into effect by the building trades contractors and material men, has spread with the result that approximately 17,000 men are now idle. Building operations in the Bay counties are over 95 per cent shut down. The remaining 5 per cent, which has been enabled to continue due to material being on hand, it is expected, will be forced to stop operations at the end of this week.

Inquiry for pig iron in this market is light. Foundries appear to have little need for added tonnage and report that demand for castings has not increased. The only sale reported this week was one lot of 200 tons of Belgium iron for a southern foundry at $33.75 a gross ton, ex-vessel San Pedro.

Demand for bars, especially reinforcing bars, has fallen off considerably, the only business being received coming from those sections not affected by the lockout. The Columbia Steel Co. is still maintaining its 2.35c mill price and appears to be getting most of the business coming up.

The Southern Pacific closed this week with the Colorado Fuel & Iron Co. for 13,500 kegs of track spikes at $3.50 base mill, $3.40 base being quoted by all eastern mills. In addition to track spikes, this same company was awarded the contract for 800 kegs of track bolts.

Practically all buyers of steel plates have ceased to call for material and there are little indications that consumers will come into the market for some time to come. One consumer received an offer on Belgium tank plates at 2.57½c delivered dock, duty paid, San Francisco and the same offer contained only a 12½c extra on 3/16-inch material. A recent sale to one consumer of approximately 250 tons was 2.00c base Pittsburgh. Steel sheet inquiry from domestic users practically is lacking. Prices are firm.

Fabricators are unable to deliver material for erection and are forced to confine their efforts to outside business. Many jobs involving structural shapes are being held in abeyance. The Judson Mfg. Co. has been awarded the contract for erecting 600 tons of steel for a new theatre in San Francisco. The Pacific Gas & Electric Co. has opened bids on two tower projects calling for approximately 1500 tons.

Very little activity features the market here for melting steel and cast iron scrap. While $11 a gross ton delivered seems the prevailing price for melting steel, one lot of 400 tons was sold at $9.25 f.o.b point of shipment or $10.25 delivered mill. Cast iron scrap is moving in carload lots only and $25 to $27.50 appears to be the market.

Surplus Steel Dominates Pacific Northwest

Seattle, May 28—Surplus retail material continues to dominate the steel market in this territory. Consequently representatives of eastern manufacturers report business is dull. The demand is far below normal and old stocks are being offered under today's prices.

Agents of French and Belgian man-

ufacturers state that they are unable to place any business in this territory under present conditions. Belgian and French bars are being offered at 2.30c c.i.f. here, not including duty, while tank plates can be laid down here on a basis of 3.00c and blue annealed sheets, 12, 14 and 16 gage, at 3.30c.

From two different sources it is reported steel bars have been offered in small tonnages in this market at 1.75c. The resale material in the market consists of surplus stocks from Puget Sound and Columbia River shipyards, also material from the navy yard and stocks purchased by Japanese interests.

Local wholesalers state that recent business shows a slight improvement over the first half of the month. Considerable small building is under way resulting in a better call for the lighter specifications. Sheet are in better demand than any other one item. Sheets also predominate in foreign inquiries.

The foundry situation remains unchanged and dealers report business quiet in this direction. In the absence of scrap demand there has been no inducement to cut prices. There is likewise no call from the Orient for scrap. No. 1 machinery scrap is being offered at about $22.50 while No. 1 railroad cast is quoted at around $21.

Wholesale warehouse prices are quoted unchanged.

Rail Wages Cut 12 Per Cent on July 1

Chicago, May 31.—Railroad wage reductions, effective July 1, will be ordered tomorrow by the railroad labor board. These average 12 per cent, will total approximately $400,000,000 and affect members of 31 labor organizations on 104 railroads. The wage cut compares with an increase of $600,000,000 ordered in 1920. In the case of section labor, the reduction wipes out the 1920 increase, the cut in this class being 18 per cent. Switchmen and shopmen lose 9 per cent, train service men 7 per cent, and car repairers 10 per cent. Railroad officials, upon learning the board's decision tonight, declared the cut was not adequate to meet the requirements of the railroads' readjustment probems.

Plant Contract Placed

Contracts have been placed by the Durant Motors Corp. for the construction of the Edward Ver Linden plant at Lansing, Mich. which will be the first unit of the company's proposed plants. The Lansing plant will entail a cost of $3,000,000 and is expected to be in production by Jan. 1, 1922.

Census Report Indicates Growth in Steel

Washington, May 31.—From 1914 to 1919 the number of manufacturing plants in the United States increased from 275,791 to 288,376 while the value of the products of these plants increased from $24,246,435,000 in 1914 to $61,588,905,000 in 1919, according to the 1920 census, states the census bureau. The growth of the iron and steel industry from 1914 to 1919 is revealed by the following statistics:

	Number of establishments		Value of products	
	1919	1914	1919	1914
Blast furnaces.	195	160	$794,467,000	$317,654,000
Steel works and rolling mills ...	484	427	2,812,775,000	918,665,000
Bolts, nuts, washers & rivets not made in rolling mills ...	147	102	91,655,000	23,403,000
Cast iron pipe	59	59	50,235,000	26,659,000
Iron and steel doors & shutters	57	43	10,877,000	5,184,000
Forgings not made in steel works or rolling mills ...	240	191	171,676,000	28,961,000
Nails and spikes, cut and wrought, including wire, not made in steel works or rolling mills ...	64	64	17,555,000	7,199,000
Wrought pipe	51	36	84,011,000	37,655,000
Hardware.	547	539	144,854,000	73,320,000
Enameling	74	77	2,645,000	2,166,000
Coke, not including gas-house coke ...	253	231	299,879,000	99,275,000
Wire	66	54	162,152,000	81,841,000
Tin plate & terne plate	23	31	97,399,000	68,343,000
Shipbuild'g, steel ...	159	79	1,454,116,000	66,217,000
Structural ironwork, not made in steel works or roll. mills	1,147	1,235	304,961,000	159,378,000
Foundry and machine-shop products.	10,918	10,640	2,321,129,000	866,545,000
Ferroalloys	31	...	40,640,000	.....
Agricultural implem'ts.	519	601	304,939,000	164,087,000

Steel Tariff Now Ready

Washington, May 31.—Except for ferromanganese, the entire iron and steel schedule of the new permanent tariff bill is now ready for introduction in the house. On ferromanganese it is reported the metals subcommittee is not yet wholly in accord. All outward appearances give the impression that the new rates will be lower, on the whole, than expected, and that in many instances rates will be imposed more with the view of obtaining a little revenue than with the idea of protection. On ferromanganese the outlook is that the new duty will not be much higher, if any, than the $2.50 a ton rate in the Payne-Aldrich tariff, Under the present Underwood act ferromanganese comes in free.

Says Metric System Is Inevitable

Washington, May 31.—Universal adoption of the metric system is inevitable, Representative Fred A. Britten, of Chicago, asserted at a dinner given here on May 25 by the American Metric association and attended by some of the delegates to the fourteenth annual conference of weights and measures being held at the bureau of standards. Other speakers were Howard Richards Jr., who is secretary of the association and presided as toastmaster and Joseph I. Howell, bureau of weights and measures commissioner of New York city, who declared that American manufacturers must adopt the system if they hope to compete in South American trade. The speakers cited the Goodyear Tire & Rubber Co., Akron, O., Waltham Watch Co., Waltham, Mass., and the DeLaval Separator Co., Poughkeepsie, N. Y., as some of the American adherents to the metric system. Representative Britten now has a metric system bill before the house, while Senator King has a like measure in the senate. Dr. S. W. Stratton, chief of the bureau of standards, was re-elected president of the conference.

W. A. Jones Dies

W. A. Jones, president of the W. A. Jones Foundry & Machine Co., Chicago, died May 30 at his home in La Porte, Ind., of heart failure after having been ill several years, aged 71 years. He suffered an apoplectic stroke about a year ago and had been in poor health since. He was widely known in the foundry industry. He was in business at Marseilles, Ill., for several years, then removing to Chicago where he was connected with the Link-Belt Co. until 1890, when he founded the W. A. Jones Foundry Machine Co. He retired from active business several years ago. He specialized in pulleys and transmission machinery and for years was known as "Pulley" Jones. He was president of the American Foundrymen's association in 1901 when the first Chicago convention of that body was held. His only son, Warren G. Jones, vice president of the company, has been general manager since his father's retirement.

Await Decision on Strike End

British Coal Miners and Mine Owners Polling Sentiment on Government's Latest Proposal of Peace—Foundry Pig Iron in Short Demand, Advances—Belgian Prices Firmer—German Exports Fall One-Half

The Iron Trade Review Staff Cable

European Headquarters,
THE IRON TRADE REVIEW,
2-4 Caxton House, Westminster, S. W.

Sterling—$3.89½

LONDON, May 30.—Indications are that the coal strike will continue at least another 10 days while the miners and the mine owners consult the sentiment of the various districts regarding the government's latest proposal for settlement. The latter involves a scaling down of wages to the prevailing economic level, softening this fall by a grant of a $40,000,000 subsidy plus owners' profits for three months. The government's aid is contingent upon the setting up of machinery for a permanent settlement of the questions involved in the strike. These proposals would entail an immediate wage cut of 50 cents per day or about 15 per cent in the present scale.

Belgian iron and steel prices are stiffer. Belgian billets now are quoted at £9 10s. ($37.00) delivered Birmingham.

A vigorous inquiry for foundry pig iron prices has developed. As a result prices of this grade of iron have advanced about £1 ($3.89½) per ton. Northamptonshire iron has been sold out. Export hematite is selling at £7 10s ($29.22).

With domestic steel production in Great Britain practically eliminated at the present time, those mills receiving foreign semifinished material are enjoying good business. Tin plate inquiry has improved.

Exports of iron and steel products by Germany at the present time are on the basis of one-half of last year's average, 135,000 tons a month.

Define Trade's Position in Coal Strike

European Staff Correspondence

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,

Sterling $4.01

BIRMINGHAM, Eng., May 19.—The position of the iron and steel trade with regard to the British coal strike is explained with remarkable lucidity and force in a joint letter published in *The Times* and other British daily papers over the signatures of Sir Hugh Bell and Alfred Hutchinson. Sir Hugh Bell is the head of Dorman, Long & Co., one of the most powerful steel companies in the north of England, though he appears in this instance as the president of the Cleveland Mineowners' association. Sir Hugh also is a great authority on industrial economics, especially from the international point of view. Mr. Hutchinson, who is president of the Cleveland Ironmasters' association, is the head of the Skinningrove Iron Co., Ltd., one of the most modern steel plants in the Kingdom. The letter in part follows:

The triangular discussion on coal miners' wages going on between the employers, the miners, and the government proceeds on the assumption that given a settlement trade will be well on the way to recover its lost position. It is important to remember that it is not the settlement, but the nature of the settlement which matters.

The members of the Cleveland iron industry, who produce one-third of the total output of the kingdom, are, with their workmen, vitally affected by the negotiations; and although they now, as heretofore, decline to discuss the merits of the dispute, wish to enter a strong protest against the payment of any subsidy to owners or men, as this will only put a tax upon other industries equally or more in need of help and postpone the general revival of trade.

We desire that the following facts should be fully known: The iron and steel industry is the largest coal and coke consumer in the country, and its continued existence depends upon a cheap and plentiful supply of fuel. At the present those normally employed therein are almost wholly idle.

Cost Reduction Imperative

If differences in the coal trade were settled tomorrow, there could be no resumption of work at the iron and steel works on the old scale without a very drastic reduction in costs.

This country cannot consume the production of its iron and steel works and must export about three-fourths of its make of pig iron and steel, or that proportion of its plant will remain idle, and acute unemployment must follow. The price is largely governed by the prices at which pig iron and steel can be made and sold on the Continent of Europe and in the United States.

Although Cleveland pig iron was selling at 225 shillings per ton at the end of 1920, its price today is 120 shillings. Good foreign pig iron is now coming into this country at 100 shillings per ton, so that, assuming foreign import prices do not further sag (a large assumption), home prices will probably fall heavily, unless we cease to be an exporting country and allow foreign pig iron and steel to replace British in our home industries.

The consumption of coal, or its equivalent, is approximately 2¼ tons in making one ton of Cleveland pig iron, and, including this in the further process of steelmaking, nearly four tons in the finished product. Considerable quantities are also used in producing and transporting the raw material used in the processes.

Direct wages in the iron and steel industry have been adjusted from time to time by the operation of sliding scales and negotiations, with a minimum of difficulty and without disturbance of the relations between employers and employed, and there is every justification for believing these adjustments will continue to be effected by the same means. When direct wages, and those in the limestone and ironstone quarries and mines have been reduced to bedrock, Cleveland pig iron cannot be manufactured, excluding all questions of profit, at the price at which foreign pig iron is now being delivered into this country, unless coke of good quality can be delivered to the furnaces at about 27 shillings per ton. At this figure the coal price must not exceed, say 14 shillings per ton at the pit, or probably even less, and then without allowing any profit on coke or on the recovery of by-products.

All industries are tremendously handicapped by the enormous increase in the cost of fuel and transport since 1914. Putting it into percentages, the increase has been about 230 per cent for coke, and about 140 per cent for railway dues. These charges must come down or the coke will not be needed, the railway company will have few

Current Iron and Steel Prices of Europe

British Market

Corrected to Date by Cable

Home Market Prices. Gross Tons at Works or Furnace

	£ s d	$
SEMIFINISHED STEEL		
Billets, soft steel	11 10 0	44.79
Sheet bars	11 10 0	44.79
Wire rods	15 10 0	60.37
FINISHED STEEL		
Steel bars, England, ¾ to 3-inch	13 10 0	52.58
Ship plates, England	19 0 0	74.01
Ship plates, Scotland	19 0 0	74.01
Beams, England	17 10 0	68.16
Beams, Scotland	17 10 0	68.16
Sheets, black, 24 gage	19 0 0	74.01
Sheets, galvanized, 24 gage	22 0 0	85.69
Rails, 60-lbs. and over	15 0 0	58.43
Tin plate, base box, 108 lbs.	1 7 0	5.26
Steel hoops	16 10 0	64.27
PIG IRON*		
West Coast Hematite	9 0 0	35.06
Hematite, East Coast Mixed Nos.	8 0 0	31.16
Middlesborough, Basic	6 0 0	23.37
Middlesborough, No. 3	7 0 0	27.13
No. 3 Foundry, Derby, Leicester, Nottingham	9 0 0	35.06
No. 3 Foundry, Northamptonshire	† . .	†....
No. 3 Foundry, Staffordshire	8 0 0	31.16
No. 3 Scotch Foundry	8 10 0	33.11
Ferromanganese 78 per cent	18 0 0	72.06
COKE		
Yorkshire furnace	2 5 0	8.76
Yorkshire foundry		nominal

*Pig iron quotations are f.o.b. furnace for delivery in the United Kingdom. Export prices generally are subject to free negotiations.
†Sold out.

French Market

Prices Last Reported

	Francs per metric ton (2205 lbs.)	$
PIG IRON		
Hematite, Lorraine	535	41.20
Foundry, Longwy, 3% Si., sand-cast	235	18.10
Foundry, Longwy, 3% Si., chill-cast	260	20.02
Foundry, Longwy, 2% Si., sand-cast	260	20.02
Foundry, Longwy, 2% Si., chill-cast	290	22.33
COKE		
French furnace	110	8.47
French foundry	165	12.71
German, Belgian and British furnace	110	8.47
SEMIFINISHED STEEL		
Blooms	550	42.35
Billets	550	42.35
Sheet bars	550	42.35

	Francs per 100 kilos (220 lbs.)	$
FINISHED STEEL		
Merchant bars	65 to 75	5.01 to 5.78
Angles	65 to 75	5.01 to 5.78
Normal beams and profiles	75	5.78
Plates, bridge and tank, 5 millimeters and thicker	85 to 90	6.55 to 7.03
Sheets, black, 3 millimeters	89 to 94	6.85 to 7.24
Bars, cold-drawn, 40 to 60 millimeters, round	95	7.32

Pig iron prices, are f.o.b. furnace; semifinished steel prices f.o.b. works; finished steel prices, according to the schedule of the Paris Consortium of iron and steel dealers, delivered.

Belgian Market

Prices Last Reported

	Francs per metric ton (2205 lbs.)	$*
PIG IRON		
Foundry, 3% Si., Belgium	300 to 325	23.10 to 25.03
Foundry, 3% Si., Luxemburg	290 to 300	22.33 to 23.10
Basic, open-hearth, Belgium	265	20.41
Basic-bessemer, Belgium	260 to 270	20.02 to 20.79
Basic-bessemer, Luxemburg	...	.....
SEMIFINISHED STEEL		
Blooms	335	25.80
Billets	335	25.80
Sheet bars	390	30.03
Wire rods	475	36.58
*Standard rails	500	38.50

	Francs per 100 kilos (220 lbs.)	$
FINISHED MATERIAL		
Merchant bars	43.50	3.35
Normal beams and profiles	47.50	3.66
Plates, 5 millimeters and thicker	60 to 61	4.62 to 4.70
Plates, 3 to 5 millimeters	61	4.70
Sheets, black, 3 millimeters	61.50	4.74
Plain wire	...	.....
Sheets, galvanized	160	12.32

*Sold on same basis as semifinished material.
All prices f.o.b. furnace or works, except finished material, for which delivered prices are quoted.

minerals to carry, and workmen will have little or no employment.

The time seems to have come when a broad outlook should be taken by all sections of employers and employed. Sacrifices will have to be general if work is to be found and trade done.

Many suggestions have appeared in the public press with a view to a settlement of the strike. Probably the most practical has emanated from Lord Weir, one of the largest founders in the kingdom, and president of the British Cast Iron Research association.

Briefly stated, his proposals are the extension of the hours of labor from seven to eight, the hours of surface workers to be restored to 1914 conditions, the restoration of piecework, and the monthly revision of rates by district conciliation boards, so as to give a pro rata relation of selling prices and wages, with a view to the maintenance of a fair margin of profit. Although they were regarded generally as a common sense proposition the proposals have fallen flat.

Strike Checks British Export Trade

European Staff Correspondence

MIDDLESBOROUGH, Eng., May 19.—British export trade is paralyzed. The miners' strike has stopped the coal export business of the Tyne and Wear and the iron and steel trade of the Tees is similarly affected. Some deliveries of iron and steel are being made out of accumulated stocks. New orders, however, are absent. Production has practically ceased. The outward freight market is at a standstill and idle shipping is moored at every available berth located on the northeast coast.

Sterling—$3.97

While British exporters of iron and steel are unable to secure overseas business vessels are arriving in the Tees with cargoes of iron and steel from continental ports. The material is offered on the British market at prices below the home cost of production. During the past six months there have been imported to the Tees from Holland, Belgium, France and Sweden, 14,135 tons of pig iron, as compared with 106 tons in the corresponding period of 1913-14, and 453 tons in the corresponding period of 1912-13.

Billets, blooms and slabs imported during the past six months amounted to 16,013 tons, as compared with 21,134 tons in the corresponding period of 1913-14, and 16,635 tons in the corresponding period of 1912-13.

Plates, bars, angles, rails, sheets, joists, etc., imported to the Tees in the

past six months amounted to 12,834 tons as compared with 13,460 tons in the corresponding period of 1913-14, and 14,041 tons in the corresponding period of 1912-13.

During April the shipments of iron and steel from the Tees were on a small scale. The largest quantity shipped was to India, the total being 10,625 tons. Of this 50 tons was pig iron and 233 tons manufactured iron, the remainder being steel. Deliveries were made to 26 oversea customers.

Only small lots of iron are being disposed of. Cleveland No. 3 G. M. B. is scarce and sales have been recorded at £6 10s ($25.82). Cleveland No. 1 also has been sold at that figure and up to £6 15s ($26.82). East coast hematite makers accept £8 ($31.76) as the home price and also for export business. For home delivery and abroad prices are:

	£	s	d	
No. 3 Cleveland	6	10	0	$25.82
No. 1 Cleveland	6	15	0	26.82
No. 4 foundry	5	19	0	23.65
No. 4 forge	5	17	6	24.35
East coast hematite	8	0	0	31.76
No. 1 hematite	8	2	6	32.26

Transactions in finished iron and steel are small. It is understood that there are substantial foreign inquiries for railway material, but the prospect of orders coming here are remote as continental producers are offering parcels at pounds, sterling, below prices named for products of this district.

Ore deliveries are being made against old contracts, but only where consumers are forced to accept delivery. For the week ended April 30 there were several cargoes of ore delivered in Tyne dock, 3400 tons coming from Segunto; 1800 tons from Bilbao; 5500 tons from Port Briera and 4400 tons from Narvik. The ore imported to Middlesborough for April totaled 61,440 tons compared with 90,100 tons for March. There were only 11 days during April when deliveries were made.

Competition Lowers Austrian Prices

European Special Correspondence

Austrian Crown—$0.0015

VIENNA, May 17.—Prices of steel bars and plates have been reduced in Vienna by 50 crowns per ton ($0.0776). Competition is making itself felt more strongly and prices seem to have turned definitely downward. They have been sustained in recent months only by the continued fall in Austrian exchange. The Alpine Montan Gesellschaft, the largest Austrian producer, has recently published its production figures for 1920. These show that the coal production was 717,760 tons, an increase of 75,900 tons over 1919. Iron ore production was 428,500 tons, an increase of 184,200 tons over 1919. Pig iron output was 98,000 tons, the increase over 1919 being 38,600 tons while the production of ingots and finished steel, respectively, are placed at 125,800 and 84,700 tons. These latter items show an increase over 1919, respectively, of 10,600 and 14,100 tons. The total production last year was considerably better than in 1919, but was still some 40 per cent under the 1913 output.

The fuel situation has improved and as a result it was possible to blow in another furnace at Eisenerz on April 10 and a third furnace at Donawitz on May 1. Further increases in pig iron production, however, are not expected under present market conditions.

Stinnes Man in Control

The president of the Alpine Montan-Gesellschaft has resigned in favor of an appointee of Hugo Stinnes.

In Czecho Slovakia the curtailment of production continues and German competition is making itself more strongly felt right along. The general business situation is clouded by the continued disturbances relating to the Upper Silesian plebiscite.

Czech Crown—$0.0075

The Berg-und Huttenwerks-Gesellschaft, the largest Czech producer, has published its statistics of production for 1920. They show a coal output of 2,031,950 metric tons, the increase over 1919 being 88,830 tons. The outputs of ingots and rolled steel were respectively 112,500 and 80,000 tons. The figures covering pig iron and steel show an increase of 12 per cent over 1919. Figures just issued also show that the steel production of the whole of Czecho-Slovakia in 1920 was 973,000 metric tons, of which 17.6 per cent was basic-bessemer steel, 81.4 per cent basic open-hearth steel, and 1 per cent electric steel. Compared with 1919 production the increase was 28.8 per cent. The industry, however, is still considerably behind its prewar standard. In 1913, 1,237,000 tons of ingots were produced in the territory.

Canadian Price Cuts Are Expected Soon

Special Correspondence

TORONTO, Ont., May 30.—The Canadian pig iron market continues dull with little activity outside a limited spot demand. The general tendency of iron consumers is to buy only in sufficient quantities to tide them over a week or two.

The Steel Co. of Canada, Hamilton, and the Canadian Furnace Co., Port Colborne, have not reduced their output but have two and one furnaces respectively in operation. Prices continue at No. 1, (2.25 to 2.75 silicon) $34.14; malleable, $34.14; No. 2 (1.75 to 2.25 silicon), $33.14 Toronto; and No. 1, (2.25 to 2.75 silicon), $36.80; malleable, $36.80; No. 2, (1.75 to 2.25 silicon), $35.80 per ton Montreal.

Demand for structural steel for bridge construction is still active and the past week has brought out inquiries for some good tonnages of structural steel for building purposes. The steel contract for the livestock arena to be erected for the City of Toronto, by Anglin-Norcross, Ltd., of Montreal, has not yet been placed. During the past week or two some good orders have been placed for structural shapes and beams. Toronto mill prices on structural shapes and beams are 3.25c. Steel bars continue fairly active, the chief buying still being done by automobile makers. Steel bars are quoted at 3.15c Toronto. The quet state of the shipbuilding industry of Canada is reflected in the plate market, the market is comparatively quiet. Plates are quoted at 3.00c to 3.05c Toronto. The demand for sheets continues to make headway and mills have had a good week in both black and galvanized. Sheet consumers generally are becoming more active.

Steel Leaders Analyze Business

American Iron and Steel Institute Earnestly Discusses Prevailing Trade Conditions and the Remedy—General Pershing Urges Steel Industry To Record War Experiences for Coming Generations—European Visitation Deferred

BUSINESS recovery in the near future is conditional upon the further progress of the readjustment movement which has been under way for some months; for the long future however, the prospects for a period of unexampled prosperity for this country are very bright. This represents a summing up of the expressions of the leaders of the iron and steel industry given at the nineteenth general meeting of the American Iron and Steel institute at the Hotel Commodore, New York, May 27.

More earnest and thoughtful discussion was centered on the business situation and the prospects for improvement than at any institute meeting in recent years. This served to demonstrate how deeply the present situation is occupying the minds of those in executive capacities in the industry. Judge Gary confined his presidential address entirely to subjects pertaining directly to business ills and problems.

The meeting was not as largely attended as some in the past, the registration numbering about 1100. It was marked, however, by several features and by a vigorous interest in national question of economic character that made it one of the most notable in the history of the organization.

It has been definitely determined that the American Iron and Steel institute will not go abroad this year in response to the invitation which was tendered some months ago by the steelmasters of France and other countries. The unsettled state of commercial and political conditions in Europe, it is understood dictated this decision. It is probable that the matter of European visitation by the institute in 1922 may receive attention later should circumstances be more favorable.

GENERAL John J. Pershing, commander-in-chief of the United States army was the principal guest of honor at the banquet Friday evening, which was marked by the brilliancy and enthusiasm that usually attends this function. Eleven hundred were present.

General Pershing received an ovation from the assemblage when he entered to take his place at the guest table, escorted by Judge Gary and other leaders of the institute. When he arose to speak, he was cheered for several minutes. Judge Gary, in introducing General Pershing, voiced his admiration of the qualities of greatness which the American overseas commander possessed and stated that the latter adequately typified American citizenship and the highest zeal and devotion it had displayed toward the winning of the war.

In his address, General Pershing uttered high praise of the American iron and steel industry for the effective and unselfish manner in which it had mobilized its resources and had backed up the American army with a supreme effort in the production of munitions and the countless needs of war in steel. He stated that some of the smaller producers suffered serious loss in supplying material to the government during the war. General Pershing described the position of unpreparedness in which this country sat idly in 1917 and before while the clouds of war came nearer and nearer. As a result when war did come a tremendous burden was thrown upon industry to mobilize its resources and put itself upon a combatant basis. He said this country must never again permit itself to be caught unprepared for war. He made the important suggestion that the leaders of the iron and steel industry record and transmit to future officials the knowledge gained from the experience of war so that it and other great industries might be efficiently and promptly mobilized for the national welfare should the emergency ever arise to demand it.

In his introductory remarks before the presentation of his written address, Judge Gary said:

"In considering the question of formulating an address for this occasion, I was somewhat perplexed. I finally determined the members of the institute were more interested in the subject of business conditions particularly as they bear upon the immediate future. From that aspect the situation is somewhat complicated. When we are considering the long future of the business of the United States, we have no difficulty in arriving at a conclusion that is decidedly favorable. The resources and opportunities of this country are so great, the position which has been reached is so high, our facilities for carrying on the affairs of this country are so satisfactory that we know there is before us the greatest prosperity that this country or any other country has ever witnessed. It is more difficult to diagnose the present situation, much less the immediate future."

Judge Gary then presented his formal address in which he gave his views of the present situation and its difficulties. On the renewed invitation for anyone to present their opinion of the business outlook, Willis L. King, vice president of the Jones & Laughlin Steel Co. was the first to respond.

"I can't help but be something of an optimist, at least a conservative optimist," said Mr. King. "Present conditions of business of course are deplorable. Looking back to the year, 1893, I am very sure that conditions then were very much worse than now. Prices then were lower than now, relatively speaking. In addition there was a great scarcity of capital especially in the steel business. It, therefore, may be some satisfaction to know that things have been worse before. In my opinion, good business is waiting upon a readjustment of many things to what we may call normal. That is an indefinite term but we probably will find out what it means before we are through. Various items will have to be changed. I speak of labor first because it is the largest item. Others are equally as important including retail prices. Cost of money and the readjustment of freight rates. All these in my opinion must be brought to a satisfactory point before we can have good business. This may not be long; in the meantime we must wait with patience,

knowing that in the long future, the steel business will continue its course of increasing influence in this country and throughout the world."

Economy is the pressing need of the moment according to C. M. Schwab. "The keynote of a quick recovery of business, it strikes me, is economy," said Mr. Schwab. "I mean economy in all directions. This is bound to redound to the future business and prosperity of the iron and steel industry. We are being forced by present conditions to get on a true manufacturing basis. I think when all is over, we can look back and see that this period was of real advantage to the iron and steel industry. Economies in matter of labor and above all else in transportation are the chief features of a constructive transformation. It is a time to conserve resources, a time to economize, a time to be hopeful, and we will all come out right."

A remedy for the present situation is what he is most interested in said James A. Campbell, president of the Youngstown Sheet & Tube Co. "Mr. Schwab touched on the thing that I would like to hear and that is the remedy," said Mr. Campbell. "Judge Gary didn't go quite far enough. I think that Mr. Schwab is right that transportation is the important thing. We can't have cheaper transportation, however, until labor is cheaper, until rails are under $47 per ton. But when labor is readjusted, the mills will be able to sell at lower prices. We need legislation to help solve the present situation. I cannot see how the railroads can get along under a system of treble control, with the the interstate commerce commission, railroad labor board handling labor, rates, and the railroads themselves, operations. The Adamson law should be repealed and Esch-Cummins law, modified. We won't have cheap transportation until there is some central control of the railroads. I am anxious that the laws be changed so that the railroads will be left in the same operating position as before the government took this over. The railroads should have the right to control and classify labor as they see fit.

"We cannot have prosperity in this country with the farmer getting present prices for his products. The farmer must receive more or buy his material for less. Prices must be leveled before he can be successful.

Judge Gary interposed to say that whether the railroads were obtaining too much in the way of rates depended upon the question if they were managed efficiently or were earning too much net profits. It seems to me, to justify a reduction of railroad rates, there must be a drop in the thing which the railroads buy, he said. "Prices have gone up in what I call a vicious circle. They must go down in a righteous circle."

Mr. Campbell again replied to declare that he had no quarrel with labor, and that it didn't make any difference what wages were paid so long as all other things were in proper proportion.

Judge Gary, presiding, opened the banquet by calling for toasts to the President of the United States, the army of the United States and to the President of France. The "President of the United States in this very room a few evenings ago, said, 'business is the biggest thing in the world. Therefore, I am for business.' As long as the President of the United States believes that, we believe he is the biggest thing in the world." This statement was loudly cheered.

Mr. Butler Sends Message

Mr. King read a message of good cheer and greeting to the institute from Joseph G. Butler Jr., Youngstown, who was unable to be present at the meeting because of illness.

In his letter to Mr. King, Mr. Butler sounded a note of optimism over the business situation. He said:

"The present is a critical period for the iron and steel industry, but there is no cause for alarm. It has grown to its present importance through a series of sudden expansions beyond the immediate needs of the country. Every decade or so, capacity for production has been increased in excess of what was apparently necessary, but the experience has been that this excess capacity was soon absorbed in the constantly growing needs of the country, and I feel confident that this will be the case in the present instance. After all, considering the natural growth of our country and the diversion of iron and steel products from domestic markets during the period of the world war, present productive capacities are not greatly, if at all, in excess of probable needs under normal conditions."

A resolution introduced by Mr. King and adopted by a rising vote returned Mr. Butler's message with one of felicitation from the institute.

Marcel Knecht, French high commissioner, expressed the debt of France to the American iron and steel industry for its great part in producing the materials and the instruments so essential to the winning of the war. He dwelled upon the spirit which had dictated the naming by the industry of the same prices on steel to France and the allies, as to the American government. He expressed the admiration of France for General Pershing and the army he commanded. He alluded to General Pershing as the man of iron in defense and to Judge Gary as the man of iron in peace. In an eloquent conclusion, he made a plea for the perpetuation of the "corporation of good feeling" between France and the United States, France would always be at the side of the United States, should the latter ever resort to arms, because it would know that "the cause was just and right."

Lewis Nixon, public service commissioner of New York, C. E. Perrin and Mr. Schwab also spoke.

Following the discussion of business conditions at the morning session, the formal program was rendered. W. J. Beck, director of the research division of the American Rolling Mill Co., Middletown, O., presented a paper on "The Development of a Commercially Pure Iron in the Open Hearth Furnace;" Charles R. Sturtevant, educational director, American Steel & Wire Co., Cleveland, described "Educational Work in the Wire Industry" as carried on by his company; Elwood Haynes, president Haynes-Stellite Co., Kokomo, Ind., spoke on "Stainless Steel." This paper was discussed by John L. Cox, assistant general superintendent of the Midvale Steel Co. and John A. Matthews, president, Crucible Steel Co. of America. At the afternoon session, the program of papers included "Recent Developments in Steel Works Power Plants," by W. N. Flanagan, steam engineer of the Ohio works of the Carnegie Steel Co., Youngstown, O., which was discussed by Arthur West, manager of power engineering and sales department of the Bethlehem Steel Co., and Richard L. Rice manager of the Lynn plant of the General Electric Co. "Molybdenum" by Arthur H. Hunter, president, Atlas Crucible Steel Co., Dunkirk, N. Y., which was discussed by John A. Mathews, president, Crucible Steel Co. of America; "The Use of Powdered Fuel under Steam Boilers," by Harlow D. Savage, Combustion Engineering Corp., New York, which was discussed by H. G. Barnhurst, advisory engineer, Fuller Engineering Co., Allentown, Pa., and by C. F. Herington, engineer, Chicago; and the "Dry Cleaning of Coal" by Means of Tables" by Edward O'Toole, general superintendent, United States Coal & Coke Co., W. Va., which was discussed by R. A. Schott, American Coke & Chemical Co., Granite City, Ill.

Officers were relected for the ensuing year at the noonday meeting of the directors of the institute.

Business Waits on Adjustments

Parity of Living Costs, Prices and Wages Yet To Be Established to Satisfaction of Purchasing Public—Patience, Courage and Fairness Will Restore Prosperity—More Steel Reductions May Be Necessary

BY E. H. GARY

"THE devastating and destructive war ending Nov. 11, 1918, left the entire world in a dilapidated and demoralized condition. Minds had become distracted, visions obscured, morals perverted, natural progress interrupted and the total economic structure disjointed. The destruction of and damage to lives and property were so great and the souls of men so embittered that it was difficult for them to think straight or to act intelligently. In this extremity it seemed desirable, but was found impossible, to establish promptly a basis for the absolute prevention of further international military conflicts. Since the armistice was signed, nearly three years have elapsed and nations have been drifting and struggling, endeavoring to formulate and adopt plans for reasonable readjustment and rehabilitation. Up to the present time there still exist doubt, discord and disorder.

"This brief outline, I think, will suggest to our minds many facts and circumstances which, combined, have brought the business situation in the United States to its present state. In a country of 107,000,000 people, requiring for their daily necessities various products aggregating in value billions upon billions of dollars per annum, which can be obtained here, having money to supply themselves, production is proceeding much below that which is actually needed for consumption.

Are Not Buying Enough

"In the richest of all nations, in property and money, with the greatest and most rapidly increasing resources, our people are not buying enough to supply themselves fully with the ordinary comforts of life, although they have the disposition and the means to do so. They are to an appreciable extent wearing their old clothing, living in their unrepaired houses, eating unusually plain food and, in various ways denying to themselves many of the things they would generally buy and utilize; and they are right in their attitude, up to a certain limit. This is in accordance with the inexorable law of supply and demand. The demand is and for some time has been below normal.

"In the main, what has brought about the present unusually low range of purchases? Why is there less building, diminished purchasing of clothing and wholesome food, less travel and reduction of expenditures for new enterprises and extensions of old?

"It is because the great purchasing public has formed the opinion that there have not been consummated complete and proper readjustments of prices; and on account of failure to discriminate between different lines or departments of business the whole economic system has suffered.

Law Must Govern All

THERE is no standard for safe and certain progress in economic effort except an established rule of law which fixes and protects the rights of everyone without discrimination. There are degrees of virtue and offense; but right is right and wrong is wrong. Wrong cannot properly be compromised nor fostered, and so long as law is in existence it must govern.—E. H. Gary.

"During the time the United States was engaged in the war there was a governmental board in Washington which, by agreement with industry, had general supervision over the selling prices of the larger producers. You are familiar with these proceedings. You were a part of them and you responded promptly and nobly to all the requisitions made by the government. After costs of production were ascertained by the federal trade commission, patient investigation by the war industries board, full opportunity for consultation and discussion, prices were fixed by the board and you promptly furnished the goods. You voluntarily reduced these prices to a substantial extent almost immediately after the armistice was signed; and three months after repeated this performance. Some have never since increased these prices, and all sooner or later have reduced them. They are now, on the average, at lease $20 per ton lower than the figures agreed upon by the government board at its last session. Assuming the steel industry has been fair and reasonable in prices up to the present time, which I need not discuss now, for it is the purchasing public which decides these questions, yet it must be admitted, I think, that there have been and still are charged and collected for certain commodities unreasonable and unfair, if not extortionate, prices. They apply to particular lines and persons. They do not pertain to the majority of lines or individuals. The present offenders, generally speaking, were not subject to limitations by the government during the war and they have continued and even increased the high prices ther obtained. They have done themselves especially a great injury and in doing so have injured others. This applies in varying degrees to sellers of products and also to members of different trades. I am not inclined to deal in personalities. It is necessary only to refer to subjects and to make some illustrations. The public is aware of the facts. Eyes have been opened. Different products have been purchased from the farmer, manufacturer or others at low cost and then passed on in one way or another and finally sold to the consumer at outrageous prices. Retail prices, especially, for many commodities are much too high. Without justification workmen have been classified and reclassified so as to designate them as skilled men. We have heard of persons whose daily wage was advanced from $3 to $10 or $12 at one time under this practice. You know of hundreds of cases illustrating what has been said and it would be useless to further specify.

Most Business Men Honest

"The vast majority of business men and workmen are sincere and fair, but there is and perhaps always will be a minority that ignore the principles of common honesty. They are sufficient in number seriously to affect the whole situation. Until these are aroused to the necessity of getting in

Presidential address presented before the American Iron and Steel institute at New York.

line with sound and decent standards of conduct, the full return to satisfactory business conditions will be more or less impeded.

"All I have ever said during or since the war concerning a return to great prosperity in this country has been predicated upon business being managed in accordance with the principles of reason, fairness and honesty.

"However, in considering the question of prices it is to be remembered that many criticisms, favorable and unfavorable, are made which are not justified. The reader or listener should be sure of the truth before reaching a conclusion. The fair-minded man, if he has any facts, will disclose them upon request. Occasionally a writer, through inexperience or lack of knowledge or otherwise, will misrepresent or misinterpret. Every one of us has been subjected to a convincing argument against the validity or soundness of attributed statements which we never made. It is quite common to build a straw man in order to give evidence of strength in destroying him. But this should never disturb our equanimity. We must admit we are liable to be wrong when we think we are right.

How Improve Situation?

"Now, what, if anything, can be done to improve the general situation? I answer the first thing for insistence, throughout the world, is the observance and enforcement of law.

"Recently we have heard of convictions for violations of the criminal law by certain business men. They had controlled selling prices and limited production to the injury of consumers. I am not familiar with the facts and do not know whether or not moral turpitude was charged. The men pleaded guilty and deserved punishment.

"And nearly every day for months we have read of strikers violently attacking men who had taken or were offering to fill the places made vacant. Indeed, it seems to be common to attempt by force to prevent operation of production plants or transportation lines. The freedom of men to work when and where they pleased has been interfered with. Many have been seriously injured and some killed.

"If laws shall be enforced and peace maintained the other questions relating to economic progress and achievement will be solved. The law of supply and demand will steadily if gradually bring about necessary adjustments which are equitable and relative and restore levels which are natural and reasonable. Business will be more or less hestitating until it is generally believed the period of readjustments is over.

"If it should be deemed necessary and wise to have governmental supervision over organized industry in order to protect the public interest I personally would not object provided the laws and rules shall apply alike to organized capital and organized labor. Many years ago at the request of a senatorial committee I submitted the draft of a bill for consideration that seemed to me then to cover the case, but there was lack of time or disposition to give it immediate attention.

"What can be done by the steel industry? Experience has more than once demonstrated that the mere reduction of selling prices does not bring large and satisfactory business. Would-be customers are delaying purchases, except for immediate and imperative uses, until satisfied that a sound and stable basis of prices has been established. There have been reductions and adjustments. Others may be necessary, even in the steel business, before complete restoration of normal conditions. I am not now prepared to express an opinion on this subject. It depends upon circumstances. As to prices and wage rates, producers and employes must be fair and reasonable, taking everything into account; fair towards each other and towards the general public.

"It is well known that at present, unless and until wage rates are further decreased, the costs of many steel producers will not permit lower selling prices. This presents a serious problem. Personally, I think under such conditions wage rates should not be reduced until or about the time selling prices are lowered. I also believe it would be unjust to reduce further wage rates before the costs of living are lower, not of course including the exceptional cases already mentioned where the rates are extortionate, as in many of the trades particularly. So far as practicable, all prices and rates should be adjusted at about the same time so that all interested might be justly and equitably treated. If a general relative basis has been or can be found then this should be maintained whether it is high or low. All interests must receive the same consideration.

If we may rely upon the statements by economic and statistical experts, the country is now headed in the right direction, and if this be true, as I believe, then our progress toward recovery, though slow at present, will increase as the days go by. The steel business on the whole is a little better this month than it was last month. General business throughout the United States has been slowly improving. It is very good in some of the western states. I am not at all discouraged.

"There is an abundance of new business, with both ability and inclination to place it, waiting for further adjustments which will put costs of living, selling prices, wage rates and other general incomes on a relative parity. As usual, many will wait too long. There is nothing the matter with the country; it is with individuals. Patience, courage and a fair disposition will bring satisfactory conditions in due time."

Another Hopeful Sign

ONE of the most hopeful signs of the times is the apparent disposition of the present administration at Washington to aid rather than obstruct the natural and legitimate progress of business. Anyone who intentionally fails to appreciate this desire or neglects to co-operate to the limit of his ability is his own worst enemy.—E. H. Gary.

Shippers To Convene

Traffic representatives of manufacturing companies which distribute their products through public merchandise warehouses will hold a convention at the William Penn hotel, Pittsburgh, June 16 and 17. The meeting will be held under the auspices of the Shipper's Warehousing and Distributing association. Uniformity, surplusages, and shortages, taxation on stock in warehouses methods of billing, systems of reporting of stocks—will be some of the subjects which will be discussed.

Shipbuilding Declines

Washington, May 31.—Further narrowing of the market for shipbuilding material is revealed by the report of the bureau of navigation, department of commerce, for May 1. On that date private American shipyards were building or had under contract 179 steel vessels of 645,224 gross tons, compared with 201 steel vessels of 734,904 gross tons on April 1. These figures do not include government ships or ships building for the shipping board. The largest tonnage building or under contract on May 1 is credited to the New York Shipbuilding Corp., Camden, N. J., for 57,590 gross tons. The Sun Shipbuilding Co., Chester, Pa., is second with 53,300 tons.

Authorities Discuss Iron, Steel and Fuel

HARLOW D. SAVAGE
Manager, Pulverized Fuel Division, Combustion Engineering Corp., New York

HARLOW D. SAVAGE, who presented the paper, "The Use of Powdered Fuel Under Steam Boilers," was born in Memphis April 16, 1880, and was educated in the Ashland, Ky., schools and the Kenyon Military academy. In 1897 he was employed by the Ashland Fire Brick Co. and remained with it until 1914. Mr. Savage helped organize the Refractories Manufacturers association and was its first president. In 1914 he was elected vice president of the American Arch Co. and later became vice president of the Pulverized Fuel Equipment Co. In the merger by which it became part of the Combustion Engineering Corp., he became manager of the pulverized fuel department.

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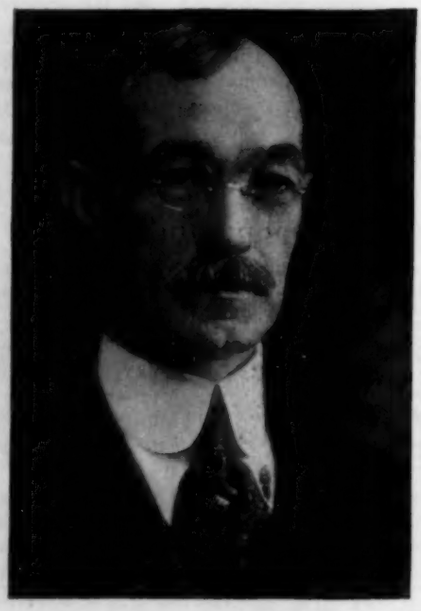


CHARLES R. STURDEVANT
Educational Director, the American Steel & Wire Co., Cleveland

CHARLES R. STURDEVANT, who presented the paper, "Educational Work in the Wire Industry," is educational director, American Steel & Wire Co., Cleveland. Mr. Sturdevant was born in Pennsylvania in 1868. He was graduated from Cornell university in 1892. After graduation he worked in the laboratories and drafting room of the Chicago, Burlington & Quincy railroad and for two years was an engineering contractor installing electrical plants. From 1896 to 1901 he was in charge of the electrical department of the Kentucky State college at Lexington and in 1901 to 1902 he was connected with the E. P. Roberts Consulting Engineering Co., Cleveland. He went to the American Steel & Wire Co. in 1905.

* * *

ARTHUR H. HUNTER, who discussed "Molybdenum," is president of the Atlas Crucible Steel Co., Dunkirk, N. Y., which he organized in 1912. Mr. Hunter, born in Colchester, N. Y., April 25, 1874, spent his early business career in the service of the government, which he left in 1905 to engage in the manufacture of cast iron radiators and boilers. He was manager of sales and engineering for the Buffalo Radiator Co., for five years. The next two years were spent in experimental work part of which was carried on in the South Works

ARTHUR H. HUNTER
President, the Atlas Crucible Steel Co., Dunkirk, N. Y.

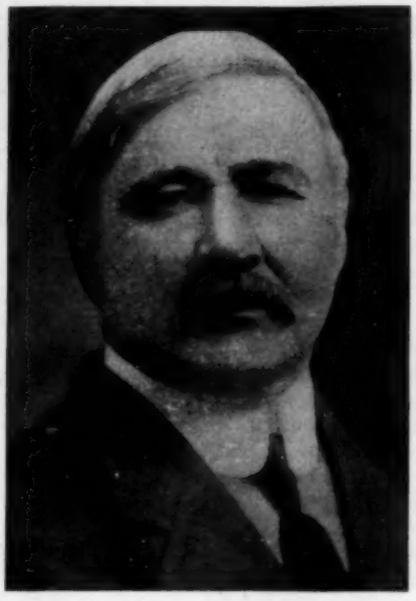
of the Illinois Steel Co. and in the plant of Joseph T. Ryerson & Sons, Chicago. Then Mr. Hunter organized the Atlas Crucible Steel Co.

* * *

WALTER N. FLANAGAN, author of the paper, "Modern Steel Works Power Plants," is steam engineer at the Ohio works, Youngstown, of the Car-

WALTER N. FLANAGAN
Steam Engineer, Ohio Works, the Carnegie Steel Co., Youngstown, O.

Present Papers at Institute Meeting



ELWOOD HAYNES
President, the Haynes Stellite Co., Kokomo, Ind.

negie Steel Co. He was promoted to that position in 1919 after two years as assistant steam engineer. For a year prior to that Mr. Flanagan was engaged in steam engineering for the Jones & Laughlin Steel Co., Pittsburgh. After graduating as a mechanical engineer from the Carnegie Institute of Technology he devoted three or four years in various shops, drafting rooms and steel works. In 1915 he was graduate assistant in mechanical engineering at Carnegie Institute of Technology and the next year was assistant to Professor Trinks on consulting work. He was born in Pittsburgh and received his early education in the Pittsburgh public schools.

* * *

ELWOOD HAYNES, author of the paper on "Stainless Steel," is listed in *Who's Who* as the discoverer of the product from which his paper got its name. Mr. Haynes has been active in discovering and inventing alloys, including tungsten chrome steel in 1881, an alloy of chromium and nickel in 1897, an alloy of cobalt and chromium in 1900 and alloys of cobalt, chromium and tungsten and cobalt, chromium and molybdenum in 1911 and 1912. Mr. Haynes was the first to introduce aluminum in automobile engines, which was in 1895, after he had designed and built the first horseless carriage. Mr. Haynes is president of the Haynes Automobile Co. and the Haynes Stellite Co. He was born in Portland, Ind., Oct. 14, 1857, and was graduated from Worcester Polytechnic institute in 1881. He attended Johns Hopkins university in 1884-1885. He taught science in the Eastern Indiana normal school next year, for four years was manager of the Portland Natural Gas & Oil Co., and for 11 years was field superintendent. He invented and built the first rotary valve gas engine in 1903.

* * *

EDWARD O'TOOLE, author of "Dry Cleaning by Means of Tables," a paper read before the institute, is general superintendent of the United States Coal & Coke Co. at Gary, W. Va. Under his jurisdiction is the largest coal mine in the world, at Lynch, Ky., with a rated daily capacity of 8000 tons. After leaving the public schools at Salineville, O., where he was born Dec. 27, 1866, he went

WESLEY J. BECK
Director, Research Division, the American Rolling Mill Co., Middletown, O.

EDWARD O'TOOLE
General Superintendent, the United States Coal & Coke Co., Gary, W. Va.

to work in the mines. In 1892 he became a fire boss for the H. C. Frick Coke Co. From fire boss he was promoted to mine foreman and later to superintendent. When the United States Steel Corp. was formed he was made a division superintendent. In 1903 his jurisdiction was extended to all mines of the Frick company. As general superintendent of the United States Coal & Coke Co. he has charge of its properties in McDowell, Mingo, Wyoming and Barbour counties, W. Va., Harlan and Letcher counties, Ky.

* * *

WESLEY J. BECK, who spoke on "The Development of a Commercially Pure Iron in the Open-Hearth Furnace," is director of the research division of the American Rolling Mill Co., Middletown, O. He has held that position nearly 11 years, having been made director, in charge of the chemical, metallurgical and electrical laboratories, in 1910. Mr. Beck was born July 28, 1875, in Lafayette, Ind., and was graduated from Purdue university.

In 1897 he was employed by the Westinghouse Electric & Mfg. Co. in the testing and engineering department. He remained with the company until 1903 when he joined the American Rolling Mill Co.

Stainless Steel Offers Wide Use

This Alloy Containing from 8 to 20 Per Cent Chromium Shows Great Immunity to Corrosion—Yields to Heat Treatment Readily and Gives Considerable Toughness—Resistance to Comparatively High Temperatures Suggest Applications

BY ELWOOD HAYNES

STEEL now has such a broad application that it conveys a wide variety of impressions, according to what one may have in mind. To the builder of skyscrapers it means monstrous I-beams and other heavy parts used in the construction of great buildings. To the railway builder it may convey the idea of rails or bars for construction of track, while to the general dealer in bar iron it may mean numerous round and flat shapes such as are demanded by the general trade. To the metallurgist it may not only mean all of these, but include also the various alloys of iron with other metals, commonly termed alloy steels.

Among these are nickel steel, nickel-chrome steel, vanadium steel, tungsten steel, molybdenum steel, titanium steel, silicon steel, manganese steel, etc. Besides these there are many combinations of these alloys, many of which have highly useful properties. All of the above, however, are to some degree subject to rust or corrosion when exposed to moist air.

With the discovery and manipulation of high-chrome steels, an alloy has been revealed and manufactured which resists corrosion to a remarkable degree, and which is now termed "stainless steel." Such a steel must contain iron, chromium and carbon and may contain various other elements, such as manganese, molybdenum, tungsten, silicon, etc. Moreover, such a steel does not become distinctly immune to atmospheric influences until the chromium reaches at least 8 per cent and exhibits its highest quality only when the alloy contains 11 or 12 per cent. Most of the combinations thus far in use contain from 12 to 20 per cent chromium as an essential constituent. An alloy of chromium with iron and carbon, containing as high as 60 per cent chromium, may be worked to some degree under the hammer if extreme care is used in its manipulation.

If steels of this character are freed from adhering scale or rust they will resist atmospheric influences to a marked degree, far excelling in this respect such metals as tin, nickel, lead, cobalt, copper, silver, etc., and such alloys as brass, German silver, monel metal, etc. For most purposes the carbon content of these steels should lie between 0.4 and 0.8 per cent, while steels of considerably higher carbon may be utilized with advantage for special purposes.

The manufacture of these steels is comparatively simple, though the best results are obtained by means of the crucible or electric furnace. Those made by melting the steel in lined graphite crucibles, when proper precautions are taken, may be teemed into ingot molds and show even less oxidation during pouring than the ordinary carbon steels. If the ingots thus produced are of small size and hence readily chilled they are usually quite hard when taken from the mold and require annealing before they can be worked on the lathe.

If small flat bars are heated to about 1500 to 1800 degrees Fahr. and allowed to cool in the air they will become hardened to a very considerable degree and for many purposes no further hardening will be necessary. If, on the other hand, extreme hardness is desired, the article may be quenched in oil or water.

After the ingot is removed from the mold it is placed in a clear fire in which coke, oil or gas may be used as fuel, and brought to a temperature of from 1500 to 1800 degrees Fahr. It may then be forged readily or rolled into bars. When properly heat treated it becomes highly elastic and may be given almost any desired hardness by drawing at the proper heat. It shows practically no scale during the hammering process, and this fact largely compensates for the increased hardness of the hot metal over that of ordinary carbon steel. It may also be drop forged under suitable dies, though it of course offers greater resistance and hence greater wear and tear on the dies.

Chromium Content Variable

As already stated, the chromium content of a stainless steel should be at least 12 per cent and may rise as high as 25 per cent without seriously interfering with the workability of the steel, providing proper care is exercised. All things considered, a very good stainless steel may be made containing 15 to 18 per cent chronium, with the carbon content ranging as high as 0.8 per cent. When such a steel is rolled or hammered into a bar and afterwards heat treated and polished it shows remarkable resistance to atmospheric influences. It may be exposed for months in a moist atmosphere, even in the vicinity of the ocean, without showing any sign of stain whatever. It may be immersed in salt water and remain indefinitely without change. It may be even boiled in nitric acid without losing its luster. It may likewise be dipped in a solution of sal ammoniac, ammonium chloride, and afterward exposed, without washing, to the atmosphere for an indefinite time without change. It is likewise immune to vinegar or mixtures of salt and vinegar, as well as to the action of citric acid. If the chromium be raised to 40 per cent or over and a small amount of molybdenum added the steel will resist boiling solutions of salt and citric acid, even in the concentrated form.

When a polished strip is heated in a bunsen flame it first takes on a pale straw color, then pale brown, gradually passing into a bright blue and culminating in a deep blue-black. Samples containing a suitable quantity of chromium may be held at a temperature of 800 to 1000 degrees Cent. for an indefinite time without showing any tendency to scale. The steel is much more rigid under high temperature than the ordinary carbon steels, and articles exposed to high temperatures hence would retain their shape much better under stress.

As already stated, the steel may be forged at temperatures varying from 800 to 1200 degrees Cent. and may be rolled readily into rods and sheets under proper conditions. By proper annealing, a bar of 15 per cent chrome steel can be rendered sufficiently soft to be worked in the lathe, though even when annealed it is much harder than ordinary machinery steel. When thin strips are heated and allowed to cool in the air they become almost file hard; and ingots cast in thin flats in a graphite or steel mold are almost file hard even when allowed to cool in the air.

The steel yields to heat treatment quite readily, though its recalescence points are generally higher and the steel does not respond so quickly to treatment as do the ordinary carbon steels. Com-

(*Concluded on Page* 1522)

From a paper presented at the annual meeting of the American Iron and Steel institute at New York, May 27. The author, Elwood Haynes, is president, Haynes Stellite Co., Kokomo, Ind.

Making Open-Hearth Ingot Iron

First Attempts with Producer Gas Used as Fuel Proved That Sulphur in Gas Contaminated the Metal—Control of High Temperatures and Proper Degasification of Iron Were Difficulties—Material Used in Welding

BY W. J. BECK

DEMAND has always existed for the purest irons obtainable. This demand has held steadfastly in the face of rapidly developing steel producing processes. The steady importation of Norway and Swedish irons throughout the entire metallurgical history up to the outbreak of the war in 1914 is sufficiently indicative of this fact. These foreign irons, however, that had to be laboriously worked down by a charcoal or puddling process, were not suited to the large-scale tonnage operations which are made imperative by American conditions of labor and industry. It is natural, therefore, that metallurgists should have been led to the consideration of adapting the open-hearth steel furnace to the manufacture of iron of at least an equal degree of purity as those types which were imported from overseas.

Before progress along this line could be made, however, grave manufacturing risks had to be faced without much foreknowledge as to whether a successful, workable and salable product could be finally achieved. Every open-hearth man knows what is implied in raising the temperature of a bath 200 degrees above the normal practice and maintaining this temperature until the carbon and manganese are run down to practical traces.

Development of the Process

The undertaking of pioneer work in this direction was certainly not altogether promising. Ledebur, the great German authority, had clearly stated in his work on iron metallurgy than any such operation with the open-hearth furnace would be in vain if not freighted with disaster. In 1903, however, an American metallurgist, H. H. Campbell, made an attempt at an open-hearth pure iron, and finished with carbon 0.025, manganese 0.040 per cent. Campbell did not follow up this step, however, and summed up his opinions in the following brief comment: "These heats were made in a basic open-hearth furnace and their regularity both in chemical and physical character shows that we are dealing with a normal and definite metal and not with an accidental product. They were purposely made with the lowest possible content of manganese and it seems positively certain that the metal must be saturated with oxygen." It is evident from the foregoing that so eminent an open-hearth man as Campbell thought that in carrying manganese down to 0.04 per cent the procedure had gone as far as possible and that only overburned metal was the result.

This then was the history of the effort to produce very low carbon-manganese metal in the open-hearth furnace when the American Rolling Mill Co. first turned its attention to the problem. The first experimental heats were made in a 35-ton furnace, and they were nursed and watched with care day and night. Continuous progress in the iron was made until finally it was possible to reduce the five ordinary impurities of iron—carbon, manganese, sulphur, phosphorus and silicon—to the point at which in the aggregate they did not exceed 0.14 per cent. At the same time special methods had to be studied to attain the maximum degree of degasification and the proper deoxidation.

The idea of a commercially pure iron was perhaps but a natural development or evolution of the efforts to supply quality sheet metal products. It was believed at the inception of this work that increased purity would lead to increased rust resistance. Ingot iron made in an open-hearth furnace differs from the older irons by having a typical crystalline structure, a more definite critical temperature range, and being essentially free from slag.

In the first heat an attempt was made to produce a metal containing not over 0.05 per cent manganese. It was done at the risk of losing the heat and the ladle, but it was felt that such a drastic step was necessary in order to determine if it were possible to make such a product in an open-hearth furnace. Care was used in the selection of the raw materials for this heat so that the melt would be as low as possible in carbon and manganese. The heat was charged in a 35-ton furnace and the bath of metal melted low in carbon, as it was believed that the lower the carbon could be driven, the lower would be the manganese. Regular open-hearth practice was followed with the exception that an additional quantity of iron ore was added to assist in the removal of the carbon and manganese. In addition to this, an excess amount of lime was charged for the purpose of eliminating as much sulphur and phosphorus as possible.

These early experiments in the open-hearth furnace were made with producer gas as fuel. This fuel was high in sulphur which contaminated the metal and presented a serious obstacle. It was found later that by the use of natural gas this difficulty was largely overcome and it was possible to produce a metal which contained a lower percentage of sulphur.

Heat Must Be Held Longer

To eliminate as far as possible the impurities in these heats, it was found necessary to hold the metal in the furnace longer than is required in ordinary steel practice. In some cases these experimental heats were held in the furnace as much as 50 per cent longer than the ordinary steel heat, with danger to the operators and to the furnace.

On tapping the first iron heat into the ladle is was wild. The normal amount of aluminum customary in making steel heats had been used, but in later developments it was found necessary to increase materially the amount of aluminum, to insure proper deoxidation and degasification.

In the early development of this iron it was made on a small plant basis, using bottom-pour ingots approximately 8 x 10 inches cross section and weighing about 900 pounds. In this bottom-pour practice is was necessary to line with fire clay brick the runners which conducted the metal to the ingot molds.

In pouring the first heat the metal was so hot that the stopper rod burned off and there was much difficulty in pouring the metal. The molds were smeared and much of the metal was lost by pouring into the mold pits. Considerable cutting of the runner and ladle lining also occurred as is shown by Fig. 1.

The ingots were stripped in the usual manner and sent to the reheating furnace for rolling into sheet bars. Here they were rolled into heavy gage bars without difficulty, and later rolled into

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From a paper presented at the annual meeting of the American Iron and Steel institute at New York, May 27. The author, W. J. Beck, is director of research, American Rolling Mill Co., Middletown, O.

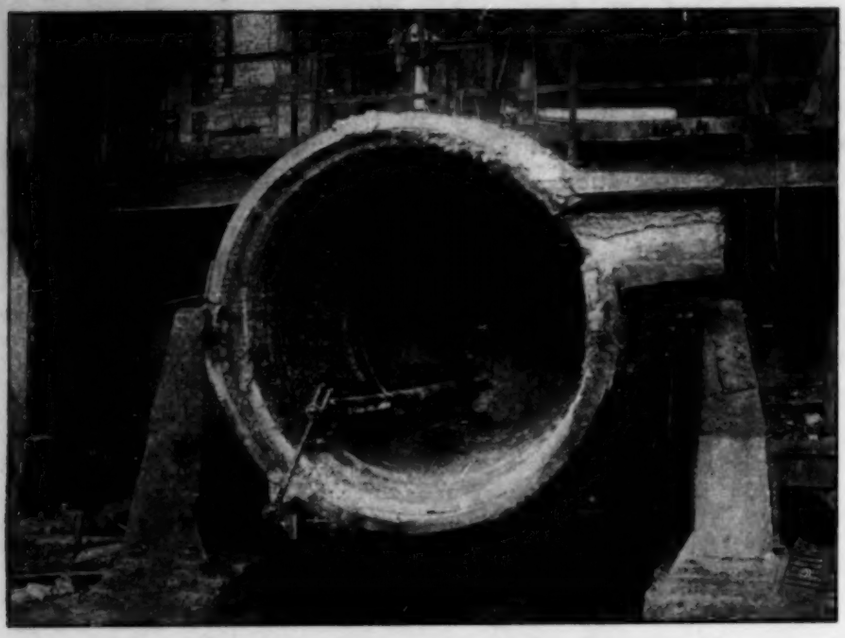

FIG. 1—LADLE TILTED UP TO SHOW CONDITION OF LINING AND STOPPER ROD, IRON OXIDE IN THE SLAG BEING RESPONSIBLE FOR THE CUTTING AND SCORIFYING ACTION

16-gage sheets and sheared to size for galvanizing.

As the next step in the operation the sheets were sent to the galvanizing shop for coating. Here considerable difficulty was found in pickling the sheets on account of the slow solubility of the metal, and also on account of the presence of foreign matter such as fire clay from the runner brick and ladle linings. In galvanizing the sheets, further difficulty was encountered in the development of blisters and rough surfaces, which were afterward found to be due to imperfect degasification of the metal.

The analysis of this first heat of ingot iron was: Silicon, a trace; sulphur, 0.028; phosphorus, 0.003; carbon, 0.03; manganese 0.04 per cent. At that time it was customary to analyze only for these five elements, the aggregate being subtracted from 100, the difference indicating the iron content.

In the manufacture of such pure metal the process of degasification was not understood. It naturally followed that a large number of sheets were produced which contained imprisoned gases. When such sheets were galvanized the expansion of the imprisoned gases caused the formation of blisters up to 12 inches in diameter, giving a product which could not be sold even as wasters, and of doubtful value as scrap. This trouble resulted in a further search for a method to eliminate the gases which were responsible for the blisters. Green saplings were used by plunging them down into the bath of metal in the open-hearth furnace after the heat was melted, in an effort to agitate the metal to help remove the impurities. This slightly reduced the time of finishing the heat, but nothing could be found to substitute for the extremely high temperatures necessary to reach the desired analysis of the metal.

These destructive temperatures shortened the life of the furnaces and very greatly increased the cost of the metal. In fact, it was impossible to make this metal continuously in the furnace because of the cutting action on the linings due to the high iron oxide in the slag. To meet this condition heats of pure iron were alternated with regular steel heats.

The experimental heats of iron produced many unusual results. One of these heats contained so much gas that nothing but piped ingots were made, in fact, some ingots were piped from end to end with only a thin wall. These had the shape of the molds and weighed but a few pounds, whereas they should have weighed approximately 900 pounds. It was an easy matter for a workman to carry one of these shell-like ingots on his shoulder.

Special efforts to secure iron of extreme purity were continued in the open-hearth department during the years 1906 and 1907. The principal difficulties, however, remained: those of the control of high temperatures necessary in producing this iron and the proper degasification of the metal.

As the experimental work progressed, considerable differences were found in the practice of producing commercially pure iron as compared to steel practice, which materially added to the cost. In the first place, it required several hours longer to make an iron heat than a steel heat, and the final temperature of the metal was 200 degrees Fahr. higher than a heat of steel. Another marked difference also was found between the percentage yield of metal as compared with the percentage yield when steel was made. The percentage of metal produced was several per cent lower in the iron heats because the high temperatures and longer time employed in the manufacture of iron oxidized more of the iron, which was lost in the slag.

FIG. 2—COOLING TABLES BETWEEN THE BLOOMING MILL AND BAR MILL TO PROVIDE FOR COOLING THROUGH THE CRITICAL RANGE

It was also found that this high iron oxide content of the slag was responsible for the cutting action on the stopper rods and bricks and that the scorifying action increased as the percentage of iron oxide in the slag increased. It has been found that the iron oxide in this slag is several times greater than the iron oxide in the steel slag. Some of this iron oxide, however, is derived from the iron ore used in oxidizing the carbon and manganese.

To emphasize the importance of the selection of raw materials in the manufacture of commercially pure iron, attention is called to the fact that certain elements which if they exist in the raw material are not eliminated in the open-hearth furnace. Among these elements which cannot be eliminated are copper, arsenic, antimony, tin, nickel and cobalt.

Early ingots frequently were split with a metal saw so that the interior structure and the degree of degasification could be studied. An example of this is shown in Fig. 7. It was found that ingots degasified with a slight excess of either silicon, aluminum or even with the use of a small amount of ferromanganese, may be perfectly sound as far as gas pockets determine this factor. Nevertheless, such material will go to pieces when rolled.

This breaking up of material with an excess of degasifying agents led to the discovery of the fact that pure iron had to be worked within a certain range of temperature; otherwise, it was found to be red short and could not be rolled. It was found also that not only was the rolling of commercially pure iron affected by the presence of impurities from the degasifying agents, but it was affected materially by the presence of sulphur. The higher the sulphur content the more difficult it is to roll this iron at any working temperature. Being almost pure, this iron has, like many commercially pure metals, a critical range at which temperature it cannot be worked. This temperature is about 900 degrees Cent., but for working conditions it is impracticable to roll between 800 and 1000 degrees Cent.

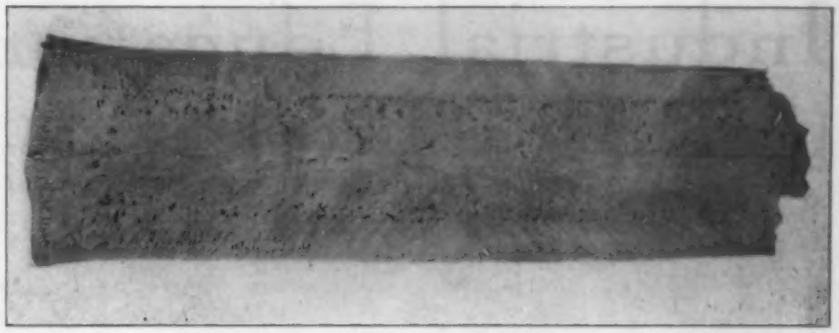

FIG. 7—AN INGOT SPLIT BY THE SAW TO SHOW THE EFFECT OF AN IMPROPERLY DEGASIFIED INGOT

In the commercial manufacture of this pure iron it is necessary to roll the material above the critical range on the blooming mill and below the critical range on the bar mill, which necessitates cooling tables between the two mills, these cooling tables being unnecessary in steel practice. This delays mill production and adds materially to the cost of iron. The accompanying illustration, Fig. 2, shows the large number of bars which are accumulated before the first bar has cooled sufficiently to make it possible to roll below the critical temperature.

Because of the tendency of the sheets to weld together at the higher temperatures the sheet bars also must be rolled on the sheet mills at much lower temperatures than usually employed in rolling steel sheet bars.

Use of the microscope plays a very important part in the final treatment of these commercially pure iron sheets, and special care is necessary in the annealing of the sheets in order that they may serve the purpose for which they are intended. Photomicrographs of a sheet as rolled on the sheet mill show, first the elongated grains, Fig. 3, and then after proper annealing the rounded grain structure shown in Fig. 4.

The photomicrographs shown in Figs. 5 and 6 illustrate clearly the effect of improper annealing upon the structure of the metal. The elongated grains of a sheet annealed near the bottom of the box, Fig. 5, are due to either insufficient time or low temperature. The coarse grains, free from strains, of the other photomicrographs, Fig. 6, illustrate the grain growth caused by annealing at too high a temperature.

After developing an open-hearth pure iron primarily for its rust resisting properties it was gratifying to find upon further study that it had many other valuable qualities. The high purity of the metal finally attained is shown by the following average analysis: Silicon, a trace; sulphur, 0.035; phosphorus, 0.005; carbon, 0.013; manganese, 0.021 per cent.

It has been found that this pure iron

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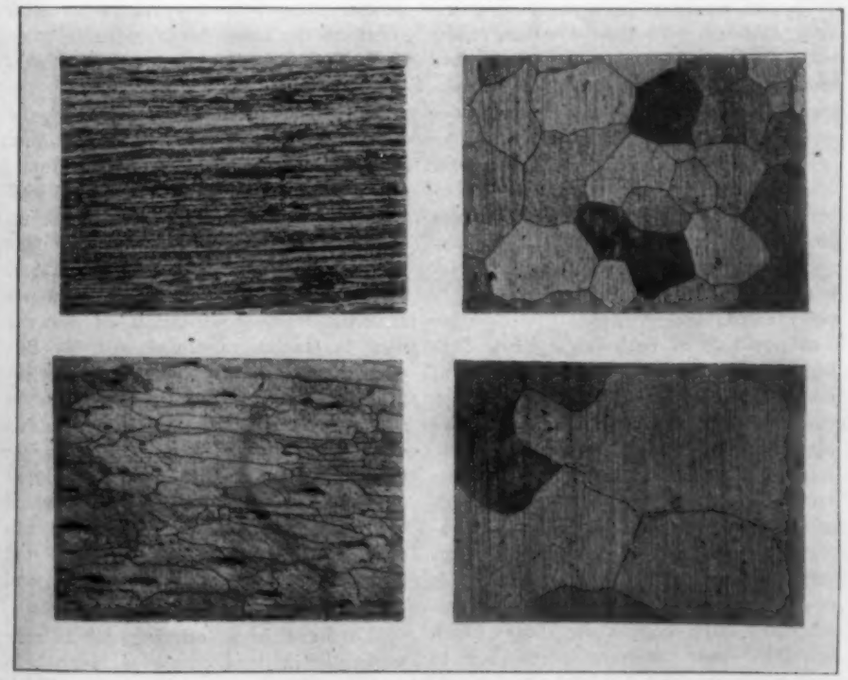


FIG. 3 (LEFT ABOVE)—PHOTOMICROGRAPH OF INGOT IRON ROLLED SHEET SHOWING THE ELONGATED GRAIN STRUCTURE. FIG. 4 (RIGHT ABOVE)—ANNEALING OF SHEET SHOWN IN FIG. 3 PRODUCES A ROUNDED GRAIN STRUCTURE. FIG. 5 (LEFT BELOW)—ELONGATED GRAINS OF A SHEET ANNEALED NEAR THE BOTTOM OF THE BOX FOR AN INSUFFICIENT TIME OR TOO LOW A TEMPERATURE. FIG. 6 (RIGHT BELOW)—THE COARSE GRAINS FREE FROM STRAINS ILLUSTRATE THE GRAIN GROWTH CAUSED BY ANNEALING AT TOO HIGH A TEMPERATURE

Industrial Education Inspiring

Many New and Useful Ideas Developed through a Broad, Systematic Training of Workmen and Foremen—Profitable for the Company, More So for the Men—How a Wire Company Brings to the Surface Their Latent Talents

BY CHARLES R. STURDEVANT

INDUSTRIAL education is generally considered as being one phase of welfare work, or as one of the essential functions of the personnel department of a manufacturing industrial organization. It is the object of this address to tell you of the educational work as at present conducted by the American Steel & Wire Corp. There was a time in the history of man when his greatest powers resided in his shoulders and legs as with the ox; in this modern intensive industrial period, however, his most effective powers lie above his shoulders. It is intensive and extensive brain power we need these days, coupled with good health and a moderate muscle.

For a number of years industries have been giving much attention to the health and general physical well-being of their employes through their accident prevention drives, athletic activities, sanitary precautions, hospitals, and pension systems. It is only within recent years that steel makers have come to realize fully the need of encouraging and assisting their employes to improve their mental powers.

At present we are conducting the following distinct educational courses: An intensive course for our salesmen, a special business English for our general office forces, Americanization courses for our non-English speaking employes, vestibule schools for skilled and unskilled workers, a trades course for up-grading our craftsmen, a special apprentice course for a limited number of our technically trained men, and a course for our foremen and supervisors. The Americanization, vestibule and trades courses are elementary in nature; the courses for salesmen and foremen are intermediate; the student apprentice course is advanced, while the business English is a special course, and the business library is used as an accessory.

The following statements apply to all or nearly all of these courses. They are intended for men of our organization who have made creditable service records rather than for new men. Admittance to any of the courses is voluntary on the part of the employe, which automatically brings to light the ambitious and the capable. No one is required to sign indentures or agreements to remain with the company after completing any course. The courses are carried on as recitation work with small classes, not as lecture courses, and we aim to give individual instruction rather than group instruction. The men are given printed lessons to study at home and the recitations are conducted by competent instructors who meet the men in conveniently located class rooms. Let us now consider each of these courses in detail, laying special emphasis on the foreman's course, which we trust will be of particular interest to institute members.

The Salesman's Course

Our educational work was begun in 1912 with a short intensive course for our salesmen. To date 496 men have taken this sales course, and a few of the earlier men are now reviewing the course. Salesmen from different sections of the country, together with a small number of supervisors from other departments, devote all of their time during six consecutive weeks to making an intensive study of materials and processes and to familiarizing themselves with all the products we manufacture.

About half of each day's work during the six weeks is devoted to mill inspection under competent guides, while the remainder of the time is divided equally between recitation work, free discussions and study. No attempt is made to teach the principles of salesmanship to experienced salesmen. By means of a special correspondence course we teach them business English and keep those who finish the sales course in close touch with all new matters pertaining to our business, and with the most essential industrial literature of the day.

The men have received much good from this course aside from that of a strictly technical nature. Three advantages only need be mentioned—they have acquired a better idea of the scope of the business; how work is handled in the different departments; and they now have a new and more thorough understanding of the difficulties involved in making steel products of quality.

Letter writing is largely an art and as such can be greatly improved by study. No arguments need be advanced to members of this institute to show the advantages of being able to write a clear, forceful, pleasing and effective business letter. Our business English course is open to all in our general offices who care to take it. A suitable text book is studied under competent instructors. Other development courses suitable for office help are being considered for future adoption.

Last year there was employed in our mills and works offices a total of over 20,000 foreign-born who spoke 82 different languages and dialects. During the past few years, along with many of the other large industries, we have been holding a number of Americanization classes for teaching the alien how to speak, read and write the English language, and for encouraging and assisting him to become an American citizen. We recently had 1600 immigrants in these classes meeting twice a week on company time under the supervision of some 80 instructors. The direct objective or the Roberts system, or a modification of this, is used in teaching these classes. By this system the student soon learns to express himself regarding the common things with which he associates in his daily life. The lessons in this course naturally prepare the more intelligent students for other and more advanced courses along technical lines. Up to the present time 600 have completed this course and have acquired a good working knowledge of our language.

We have been offering all of our musically inclined employes much help and encouragement through the development of several different musical organizations. There are now at our various works about 25 brass bands and a number of orchestras, glee clubs, quartets and so on, each being developed under most capable leadership.

From a paper presented at the annual spring meeting of the American Iron and Steel institute, New York, May 27. The author, Charles R. Sturdevant, is educational director, American Steel & Wire Co., Cleveland.

There are three groups of men directly concerned in the production of steel, the skilled and unskilled workers who fashion the material passing through the mills, the mechanics who keep the wheels turning, and the foremen and supervisors who are the top-sergeants in manufacturing industry. Our aim is eventually to aid the first and largest group in vestibule schools, which will be placed under the supervision of our foremen or works superintendents. The time to help the worker and to place him to best advantage is by giving specific job instruction at the time he enters the works, and the vestibule school, which was developed to such a high state of efficiency during the war, is especially well suited for this purpose. In such a school a young or inexperienced man may in a few days or weeks be taught to operate effectively a fairly intricate machine and at the same time be taught all essential shop rules and company policies.

We are not attempting to give any of our employes a general education; that cannot be done by industry. We are simply furnishing the machinery, in the shape of equipment and carefully trained instructors, for encouraging, directing and aiding our employes to improve their mental powers along special lines best suited to the needs of each individual.

Once convinced that the company has no ax to grind, no sinister motives back of it, our men have not only responded to the opportunities offered in a most encouraging manner, but they are seeking admittance to the various courses offered, and once admitted they go to work with a will that has been most surprising and gratifying.

This last statement was clearly exemplified last fall by the hearty response made by the tradesmen in the mechanical departments of a certain group of works in the Cleveland district which was purposely selected for the development of a course suitable to this class of employes. Even though we had been requested by representatives of these men to start such a course, we had expected only 40 or 50 men to respond to these first classes, but instead of that number 346 applied. These were cared for and the shrinkage from that large number has been much less than was anticipated even under recent adverse conditions. This course covers those fundamentals in shop arithmetic, in the elements of applied science, free-hand pencil drawing and highly specialized trade knowledge, which the electrician, the machinist and the pipe fitter and carpenters should know and which all ambitious men are anxious to learn. These men are taking this work on their own time and at a considerable personal sacrifice, and many are still working diligently to master their arithmetic. This course will naturally serve as a feeder to the foreman's course. Somewhat similar to this, we have in many of the shops a small number of minors taking the old fashioned apprentice courses to learn the various mechanical trades.

It may be questioned why these men did not receive this academic knowledge at the public schools, or why they do not now attend night schools. In answer to the first question, we have only to be reminded that according to an accepted authority 10 per cent of the children in this country leave school before they are 13 years of age, that 40 per cent leave before they are 14; that 70 per cent have left by the time they are 15, and that 85 per cent have left by the time they are 16 years old. Only a small percentage ever enter high school and less than 25 per cent of those who enter finish the high school course.

Student Apprentice Course

We have inaugurated a special advanced apprentice course of two years in which a very limited number of young men chosen from the organization by our managers are given an excellent preparation for holding minor executive positions. The requirements for entrance to this course are a commendable company service record, sufficient technical knowledge to enable the student to receive greatest benefit from the course, and favorable personality qualifications. These men are required to spend two years in different mill departments doing actual production work, and they are required to take our foreman's course and an added assigned course of reading in technical and industrial literature. The number of men taking this course will purposely be kept very low so as not to discourage promotion from the ranks.

Three years ago we started our first foreman's class and today we have enrolled about 400 foremen, prospective foremen and supervisors. Ten men, recommended by mill superintendents or managers, make up each class, and they meet with an instructor twice a week in suitable class rooms which are arranged in or near the mills where the men are employed. The class men go directly from their work to the recitations at convenient periods during the working day. The complete course consisting of 175 lessons requires the greater portion of two and a half years, though a few of the classes have been able to shorten this time by doubling up the lessons. This period may seem a long one, but extended educational work requires time and costs real effort; it must spread over a long period to be effective, especially with adult men unaccustomed to study. We have six specially trained young men serving as instructors who give all of their time, and three others who give part time, to these classes.

The scope of the lessons comprising this course covers practically all the activities of a foreman in steel and wire mills. It is a special upgrading educational course, but does not go extensively into the details of any one subject for this would not be desirable, even if possible. The foreman's chief function is quantity and quality production within cost and schedule limits; therefore, he should know much about materials and processes and he should have good business traits. The bulk of the lessons are devoted to the technique of the steel and wire business. He is required to maintain efficiency, discipline, stability and morale among his workmen, and to work harmoniously with other foremen and with his administrative superiors.

There are over 20 lessons on the subject of management. He is responsible for the general welfare of those over whom he presides; therefore, he should be a student of all those welfare activities now common to industries. There are suitable lessons covering this subject. Finally, he is placed in charge of a valuable plant and he should be acquainted in a general way with the general engineering features involved in the equipment and operation of his plant. All this requires that his education should be general and broad rather than highly specialized, and that the educational program be a compromise. Being a graduate of the ranks the foreman will furthermore need considerable training in academic subjects before he can get very far in his advanced technical studies. He therefore begins the course by studying those elementary principles of physics and chemistry which underlie all processes in steel and wire making. The course ends with a study of business English.

At the close of the course each student is given an engraved diploma and he is graded in accordance with his educational record, his service record, and his observed prominent characteristics. Special ratings are made independently by his instructor and his superintendent along the lines so effec-

tively developed during the late war by the psychological staff of the surgeon general's office for the selection and advancement of all army officers. This rating scale system we find is also bringing about quite a favorable reaction upon all those who have to make them out. We will keep in touch with all graduates and keep them in touch with advances in our business by means of a continuation course, as with our salesmen.

Proper Instructor Necessary

In the development of such a course as I have outlined we have found that success or failure depends largely upon the qualifications of the instructor. Next in importance I would place the subject matter of the unit lessons and their general make-up, and finally, the recognition by the management of merit developed by the special training given the men. This need not take the form of increased wages, for men respond to recognition of achievement and they appreciate an opportunity to express themselves in their work.

Though our foreman's classes have been in operation only three years this period has been sufficient to disclose a few definite beneficial results both to the men and the company. From the very nature of the case, the individual must receive the greater benefit from such an education, the company's benefit being secondary, but still sufficiently worth while.

One of the greatest benefits of this course, both to the men and to the company, comes from the fact that it imparts to our men many new and useful ideas which they are applying in their daily work. We have already sold over 900 volumes of technical books to these men at wholesale prices, and we are taking steps to further develop and enlarge our industrial library as a partial result of the increased demand from our student employes for more books in order to obtain further information concerning the topics covered by the lessons.

I could relate numerous instances in which these men have already applied their knowledge to the betterment of working conditions, such as making improvements in machines, tools and in processes, improving fuel consumption, handling men, and so on. One of our general foremen only a few weeks ago told me that while studying one of the lessons he received a new idea which set him to thinking about a certain process in his department and that as a direct result of this new idea he instituted a series of experiments which now gives good promise of completely revolutionizing this particular process. This one improvement when perfected will effect a yearly saving to the company considerably in excess of the total annual cost of all the educational work we are doing, to say nothing of the stimulative effect it will have on other men.

A man feels that he belongs to the company when he begins to use the opportunities offered by it for self-development. He becomes a vital part, a member of it, and his interest in its welfare becomes a personal matter with him. While it is not always possible to change his position, it is possible to greatly change his attitude toward the job through instruction.

The course makes for better reasoning powers and more accurate judgments. It organizes and vitalizes the working knowledge previously possessed by each student employe, and it supplements it with fundamental academic and scientific knowledge. It has greatly helped our foremen to strengthen and recognize and build up their own department. It has discovered and developed much talent in the organization.

Stainless Steel Offers a Wide Use

(*Concluded from Page* 1516)

plete data under various heat treatments is lacking, but the following may be taken as fairly representative: Elastic limit, 115,000 pounds per square inch; tensile strength, 200,000 pounds per square inch; elongation, 2½ per cent; scleroscope hardness, 80.

It will be noted that the elongation of the heat treated steel of this character is rather low, but on the other hand it is distinctly perceptible. It will be noted further that the ultimate breaking stress is considerably above the elastic limit, which indicates also that the steel is much tougher than a carbon steel of the same hardness.

The peculiar properties of stainless steel suggest its use for a great variety of purposes, such as pans, kettles, knives, forks, hatchets, saws, chisels, etc. Indeed, all these utensils and instruments have been made from stainless steel with good results. The alloy also doubtless will find larger use in the form of pump shafts, driving shafts, ship propellers, etc. Its high modulus of elasticity and high tensile strength as compared with bronze especially recommend it for the latter uses. Its resistance to comparatively high temperatures, together with its tendency to retain its form, will doubtless render it of great service in the form of retorts for various operations such as gas making, shale distillation and various other uses.

Owing to the comparatively high percentage of chromium, the cost of the steel will always be more than that of the straight carbon steels, but even so, it will doubtless find wide economic use because of its permanence and reliability under trying conditions. Its application to concrete work which is exposed to salt water also suggests an important application of the steel.

Producing Open-Hearth Ingot Iron

(*Concluded from Page* 1519)

galvanizes easily and takes on an unusually heavy coating which has little tendency to peel when the metal is fabricated.

The purity of this product and the careful methods used in its manufacture make it homogeneous and it therefore flows uniformly when heated to a melting temperature. This characteristic led to its use for many purposes where the cost or efficiency of welded articles depended upon quality of the weld or ease of welding operations. The welding quality of commercially pure iron created a demand for this material in the form of welding wire and rods to such an extent that conversion arrangements were made for the manufacture of large quantities of commercially pure iron welding rods and wire. This material has already largely displaced the welding materials of foreign manufacture previously used in this country. Welding wire made from this metal is used for electric arc welding and gas welding. This iron when drawn into wire has a very low electrical resistance for a ferrous metal. Its conductivity is approximately 18 per cent of the conductivity of copper.

Another important use of this commercially pure iron lies in its excellent vitreous enameling properties. In the degasification of the metal in the open-hearth process the detrimental gases practically are eliminated. Enameled products made from it have a desirable finish and are free from blisters, pinholes and other enameling defects.

The average analysis compiled from records covering a period of 12 months gives the iron a purity of 99.865 per cent, this taking into consideration the nine impurities—silicon, sulphur, phosphorus, carbon, manganese, copper, oxygen, hydrogen and nitrogen.

In addition to almost 200,000 tons of ingots produced in this country during the last year, pure iron made in the open-hearth furnace is being produced abroad and used extensively in Norway and Sweden.

Molybdenum and Its Use in Steel

Ample Supplies Are Available in the United States—Properties of Molybdenum Steel Compared with Those of Other Alloys—Use of Molybdenum in High-Speed and Commercial Steels

BY ARTHUR H. HUNTER

MOLYBDENUM is found in the crust of the earth in the combined state with oxygen or as the compound of sulphur (MoS_2). Molybdenite contains 59.95 per cent of molybdenum and accounts for more than 90 per cent of this mineral resource. Specimens of this mineral are reported throughout the world in rocks of igneous, metamorphic and sedimentary origin in numerous geological occurrences and distributions.

The deposits of major commercial importance so far developed are situated in one or two districts in the respective countries of Canada, Norway and Australia and within a few states of the United States. With the exception of the state of Colorado, an examination of the available data on all other properties show lodes of ore of limited width and restricted continuity, the metal being prevalent in large flakes, exhibiting in places a run of mine content of 5 per cent or more molybdenite. The formation in Summit and Lake counties, Colorado, is a massive low grade deposit uniformly distributed through an altered granite, according to the United States geological survey. In dimensions and tonnage this is comparable to the well known porphyry copper deposits of the United States. The molybdenite occurs in flakes that are almost microscopic in size disseminated through the rock. The ore mined averages a uniform content of 0.8 per cent molybdenite with a variation that rarely exceeds 0.1 per cent.

The oxygen compounds of molybdenum in nature definitely established are listed as eight in number with a varying content of from 3.4 to 68.18 per cent molybdenum of which six may be classed as of mineralogical interest only. Of the remainder, molybdite is an alteration product of molybdenite; and wulfenite ($BbMoO_4$) containing 26.15 per cent molybdenum in deposits capable of yielding tonnage is confined to the state of Arizona, according to present statistics, with indications that the available resources of this mineral are limited.

The conversion of molybdenite is affected by electrothermic processes directly from the sulphide by an admixture of lime and carbon or other reduction methods. In the indirect process the molybdenite is converted to oxides or halides, which are reduced to metallic molybdenum by reaction with carbon, hydrogen or other reducing agents. With these is also included the aluminothermic process. Alloying iron with molybdenum forms ferromolybdenum.

Derivation of the Word Molybdenum

THE root from which the word molybdenum was derived was molybdos, the Greek word for lead, and in the work of Pliny, molybdaena was a designation applied to various substances containing lead. In the eighteenth century the usage of the word molybdaena was contracted to embrace the minerals graphite and molybdenite only, which resemble each other in color, luster and hardness and were then thought to be the same. In 1778 Scheele proved that molybdenite (MoS_2) was not graphite and the element molybdenum was isolated therefrom by Hjelm in 1790. Mendeleeff classified the element in group six of the periodic table between chromium and tungsten.

Properties and Uses

Metallic molybdenum is a white metal resembling platinum. It has an atomic weight of 96, is ductile and soft, and has a melting point around 4500 degrees Fahr.

Metallic molybdenum of requisite purity to fulfil the manufacturing operations is worked into wire and sheets for use alone or alloyed with tungsten as an electric resistor in heating and taken to provide a surrounding substance so the metal will not oxidize. When alloyed with tungsten it is said to be a partial substitute for platinum.

Molybdenum forms many compounds with oxygen and likewise sulphur of which the prevailing sulphide is MoS_2 and the oxide MoO_3. The sulphides, as such, have no commercial applications and the oxide MoO_3 has a very limited use. With the halogens and cyanogen a large number of salts have been prepared, some of which are quite complex. Molybdenum will also combine with nitrogen, phosphorus, boron and silicon.

Molybdic oxide is the basis for the manufacture of a number of commercial salts of which certain ones are used for the manufacture of molybdenum steel and in the chemical laboratory for the analytical determination of phosphorus. Some of these salts are used as a pigment in pottery, rubber, textiles and leather; to purify and recover alkaloids and for blue print paper.

Ferromolybdenum as employed in the manufacture of molybdenum steel is supplied in analyses that range from 50 to 90 per cent molybdenum, preferably from 50 to 60 per cent, which alloy has the lowest melting point at about 2600 degrees Fahr. and will therefore diffuse more rapidly and uniformly through the steel bath. The relative amounts of the copper and phosphorus in ferromolybdenum should not exceed 1½ times the content in the concentrates when the conversion is properly conducted.

Molybdenum alloyed with the higher percentages of chrome forms an acid resisting alloy and indications are that it produces beneficial properties when alloyed with bronze and brasses.

From the earliest advent of high-speed steels it has been sought to replace tungsten as the principal alloying element in such steels with molybdenum. Molybdenum high-speed steels have generally contained from 5 to 8 per cent of this metal, but investigators invariably report that in these percentages molybdenum acts erratically and that while occasionally excellent results are obtained, it is difficult to duplicate them and further that the molybdenum has a tendency to volatilize out of the surface of the steel when it is heated for forging, rolling or treatment. This makes the steel unfit for use in tools which permit of considerable grinding in order to remove the skin of material which has been rendered useless. Because of these characteristics investigations have followed the line of endeavoring to discover some element or elements which in combination with molybdenum would act as a stabilizer for the latter.

In 1919 Arnold and Ibbotson reported on an extensive research embracing several types of high-speed steel, the chromium content being kept constant and

From a paper presented at the spring meeting of the American Iron and Steel institute, New York, May 27. The author, Arthur H. Hunter, is president, Atlas Crucible Steel Co., Dunkirk, N. Y.

Table I

Comparison of Vanadium and Molybdenum Steels

TYPE 1.—.40 TO .50 CARBON

Type	C	Mn	Cr	V	Mo
Chrome-vanadium	.47	.85	1.19	.15	...
Chrome-molybdenum	.41	.68	.95	...	.24

Sections, ¾-inch round, quenched in oil from 1560 degrees Fahr. (V.) and 1500 degrees Fahr. (Mo.). Drawn to show tensile strengths indicated.

Type	250,000 lbs. T. S. E. L.	El.%	R/A.	225,000 lbs. T. S. E. L.	El.%	R/A.	200,000 lbs. T. S. E. L.	El.%	R/A.
Cr-V	215,400	11.0	38.5	201,000	12.3	42.3	184,000	14.0	47.0
Cr-Mo	222,000	9.0	43.5	201,000	10.3	47.9	179,000	13.3	52.2

TYPE 2.—.23 TO .30 CARBON

Type	C	Mn	Cr	V	Mo
Chrome-vanadium	.27	.71	.98	.15	...
Chrome-molybdenum	.28	.64	.70	...	.20

Sections, ¾-inch round, quenched in water from 1625 degrees Fahr. (V.) and 1525 degrees Fahr. (Mo.). Drawn to show tensile strengths indicated.

Type	175,000 lbs. T. S. E. L.	El.%	R/A.	150,000 lbs. T. S. E. L.	El.%	R/A.	125,000 lbs. T. S. E. L.	El.%	R/A.
Cr-V	157,300	15.0	60.5	137,500	17.7	62.8	112,400	21.2	66.9
Cr-Mo	163,400	15.5	59.3	141,200	18.7	63.4	117,800	22.8	69.0

the content of tungsten, molybdenum and vanadium being the variables. The steels were rated in the following order, according to their cutting efficiencies: Molybdenum - vanadium, tungsten - vanadium, tungsten - molybdenum - vanadium, tungsten-molybdenum, tungsten and molybdenum.

The authors also state that with about 1.25 per cent vanadium present the ratio of hardening power becomes 27 to 1. From these tests it is to be inferred that the presence of the vanadium had overcome the tendency of molybdenum to show erratic results. However, there is nothing in the report to indicate that surface volatilization had been eliminated by this means. The lathe tools used had considerable metal removed from the cutting edge by grinding before being tested. It has recently been reported from abroad that cobalt, together with vanadium, has produced the much sought stability of the molybdenum alloy in high-speed steels. Dr. J. A. Mathews, however, asserts that these elements, both alone and separately, were thoroughly investigated in this country in prewar years without success and that a recent test by the Halcomb Steel Co. had verified the fact that molybdenum was not to be stabilized in this way.

It can be confidently stated, therefore, that while there are many eminent metallurgists who believe there is promise that this problem will be solved and a method will be evolved permitting the efficient employment of molybdenum in steel in percentages greater than 1 per cent and as a substitute for tungsten in high-speed steels the commercially successful molybdenum high-speed steel has not yet been produced.

Dr. J. A. Mathews points out that magnet steels having a molybdenum content of from 2 to 4 per cent were investigated by Madame Curie in 1898 and by himself and Dr. E. L. French in 1902, and that while permanence values were good the steels were lacking in residual density. Since these tests were made there has been no effort, to the writer's knowledge, to promulgate a molybdenum magnet steel. This problem probably has an intimate connection with the above mentioned difficulties when molybdenum is present in the higher percentages, and until a way has been found to bring the effect of this element on steel, in quantities greater than 1 per cent, under proper control, there is small likelihood that molybdenum will play an important part in permanent magnet steels.

Less Than 1 *Per Cent in Steel*

It has long been recognized that molybdenum when present in steel in quantities up to 1 per cent was subject to none of the drawbacks mentioned above. Dr. Sargent has called attention to the fact that Leon Guillet in the *Revue de Metallurgie*, 1904, showed its favorable effects on the strength and ductility of mild steel when added in fractional percentages and that Thomas Swinden in 1911 indicated that from a commercial standpoint mild chrome-molybdenum steel might well replace the high-grade nickel-chromium steels then on the market.

It is in this field of mild steels for structural parts of machines requiring high elastic properties that the present development in connection with molybdenum occurs and this development came about during the war and was almost exclusively confined to this country. True, there was a large demand for molybdenum from Europe in the course of the war, but this demand was chiefly from England, where the shortage of tungsten was acute and molybdenum offered the best substitute in the manufacture of tool steels. There were rumors that the Germans were using a molybdenum bearing steel in cannon and the French added this metal to the high-grade nickel-chrome steels employed in heavy breech blocks, but it was American munitions makers who made the widest use of molybdenum steels in light armor plate and the vital parts of airplane motors, automotive vehicles, etc.

There is no doubt that the development on a commercial scale of structural steels containing less than 1 per cent molybdenum was greatly retarded by the supposed rarity of the metal and the difficulty of obtaining it in sufficiently pure form to guarantee the production of sound steel in tonnage quantities. Early investigators were discouraged because of the low grade material with which they had to work. The war demand, however, stimulated research and led to the discovery and development of large and remarkably pure ore bodies in this country and to great improvements in methods of refining until at present there is an established molybdenum industry assuring the production of this metal in forms which offer no difficulties in the manufacture of steels of the highest type.

The use of fractional percentages of molybdenum for the manufacture of commercial structural steels is due in large measure to the work of C. Harold Wills of Marysville, Mich. Mr. Wills, with the assistance of H. T. Chandler, metallurgist for C. H. Wills & Co., after convincing himself of the abundant ore supply in this country, conducted extensive experiments with molybdenum and practically all other possible steel alloying elements in various combinations.

Molybdenum, always in these small percentages, has been found to have a beneficial effect on the physical properties of mild structural steels when added alone to a straight carbon steel, when added in combination with another element such as chromium or nickel to form a ternary alloy steel, or when added to a ternary steel to form a quaternary steel such as chrome-nickel-molybdenum steel or chrome-vanadium-molybdenum steel, and this strengthening and toughening effect has been found to be progressive as the content of molybdenum is raised from a small fraction of 1 per cent up to 1 per cent. For the more general structural purposes, where extreme properties are not required, the combination of chromium and molybdenum has been found most efficient when commercial factors are taken into consideration. Where more exacting duties are imposed, one of the more complex quaternary steels mentioned above should meet the requirements. In cases where the steel must pass through difficult cold-forming and pressing operations, it has been found advisable to employ a simple low carbon steel with the addition of molybdenum.

Molybdenum added to carbon steels, especially those of extremely low carbon content, is largely in solid solution in the ferrite, to which it adds both strength and ductility. Where chromium is present, however, together with sufficient carbon, it seems probable that the molybdenum acts in two ways, the greater part combining with the chromium and carbon to form complex carbides and the balance being diffused in the ferrite.

A great deal has been published recently on the action of molybdenum in steel considered primarily from a technical standpoint. A summary of the purely practical and commercial features of this alloy might be of greater interest than a more technical resume, and with this in mind the following is presented:

From the strictly practical viewpoint there are, broadly speaking, four prime factors to be considered in connection with any steel: The manufacture of the steel itself, the physical properties of the finished steel, the adaptability of the steel to fabrication and the total cost of the fabricated article.

Manufacture of the Steel Itself

The production of some 50,000 tons of molybdenum steel has served to place melting practice on a firm basis. Molybdenum may be added to the electric or open-hearth bath either in the form of calcium molybdate or ferromolybdenum. Greater precautions are necessary in the open-hearth with the former than with the latter. In this type of furnace the method which has been found most advantageous is to make the addition as the charge is melting down and before the slag has formed. This practice insures a complete and uniform diffusion of the molybdenum through the steel. In this process nearly all of the molybdenum remains in the steel, and losses, whether mechanical or due to volatilization and oxidation, are extremely small. The molybdenum in scrap can be recovered when remelted in like proportion to the original addition. The total alloy efficiency in average practice is well over 90 per cent. In the electric furnace the positive control of slagging and atmospheric conditions renders an even higher recovery possible.

Molybdenum steels, as a class, when compared with other alloy steels which are in the same category from a commercial standpoint, treated to the same tensile strength, show a slightly higher elastic limit, hence a somewhat higher elastic ratio; a higher elongation, hence greater ductility, and a much higher reduction of area, hence appreciably greater toughness.

This latter property is probably the most pronounced individual physical result of the addition of molybdenum to steel. In tests made under the direction of Dr. J. S. Unger compared with the carbon steel, chrome-molybdenum showed 33 per cent increase in elastic ratio 16 2-3 per cent increase in elongation and 56 per cent increase in reduction of area. Compared with the nearest alloy steel, the chrome-molybdenum showed 1.7 per cent increase in elastic ratio, a little over 6 per cent increase in elongation and 12.8 per cent increase in reduction of area. The tensile strength of all these steels having purposely been made the same, the only possible variables were these three.

In order to give an idea of how the chrome-molybdenum series of alloy steels compares with chrome-vanadium steels a comparison of two types of each follows. The data on both of the chrome-vanadium steels is taken from a recent booklet published by the Vanadium Corp. of America, presenting charts plotted by the metallurgical department of the United Alloy Steel Corp. The data on both of the chrome-molybdenum steels was furnished the writer by the metallurgical department of the same company. The results of both series of tests, which were made on open-hearth steels, are shown in Table I.

It should be noted that the molybdenum content of both of these types of the chrome-molybdenum steel is extremely low. For a comparison on a purely commercial basis, steels containing double the above content of molybdenum and showing higher physical properties might well have been used.

It has been shown that the physical properties of molybdenum steel were progressively better as the molybdenum content is increased up to 1 per cent, and the following is presented to illustrate this point. Sections, 1¼ inch round and 1¼ inch square, were quenched in water from 1550 to 1600 degrees Fahr. and drawn to show a tensile strength of 175,000 pounds per square inch. The analysis range was: Carbon, .28 to .36; manganese, .44 to .64, and chromium, .70 to 1.04 per cent. The elastic limits for steel containing 0.20, 0.40 and 0.76 molybdenum, respectively, were 167,000, 164,000, and 162,000 pounds per square inch.

For a constant tensile strength and very nearly constant elastic limit the ductility of the steel is greatly increased by the addition of molybdenum from 0.20 up to 0.76. Conversely, of course, by employing suitable drawback temperatures, for a given ductility the elastic limit and tensile strength will show an increase in like manner.

Have Remarkable Physical Properties

The more complex quaternary alloy steels containing molybdenum show extremely high characteristics as will be seen by reference to Table II. Both of these steels can be drawn back to better than 1000 degrees Fahr. before the tensile strength falls below 200,000, and to 900 degrees Fahr. before the elastic limit falls below this figure. The steel containing nickel exhibits remarkable phyical properties at low drawing temperatures such as are employed in the production of oil hardened gears, whereas the steel containing vanadium possesses greater possibilities at the higher drawing temperatures.

A low carbon steel to which about 0.25 per cent molybdenum is added possesses extreme ductility, which makes it particularly adapted in sheet form to the manufacture of pressed steel parts and at the same time when heat treated is capable of showing fairly high physical properties. Molybdenum steels also have the property of deep hardening, especially noticeable in the chrome-molybdenum series. Their properties are developed

(*Concluded on Page* 1531)

Table II

Characteristics of Quaternary Alloy Steels

	C	Mn	Cr	Ni	V	Mo
Chrome-nickel-molybdenum (1)	.44	.42	.99	2.04	...	.36
Chrome-vanadium-molybdenum (2)	.38	.60	1.00	...	.18	.80

Sections, ¾-inch round (1), quenched in oil from 1450 degrees Fahr., and 1⅛-inch round (2), quenched in oil from 1600 degrees Fahr., both drawn as indicated.

Results of Tests on (1) Chrome-Nickel-Molybdenum Steel

Drawing Temp. F.°	Tensile Strength	Elastic Limit	Elongation Per Cent in 2 Inches	Reduction of Area Per Cent
400	336,600*	302,000*	10.0*	22.4*
600	275,000	241,000	11.3	43.0
800	240,000	220,000	12.0	46.0
1000	204,000	185,000	15.0	51.0
1200	152,000	134,000	20.5	61.0

*Section treated .505-inch round.

Results of Tests on (2) Chrome-Vanadium-Molybdenum Steel

Drawing Temp. F.°	Tensile Strength	Elastic Limit	Elongation Per Cent in 2 Inches	Reduction of Area Per Cent
600	243,000	217,000	9.0	38.2
800	225,000	207,000	10.8	45.4
1000	210,000	197,000	14.0	52.5
1200	186,000	174,000	18.2	59.7

Seek Economy in Power Plants

Steelworks, with Large Possibilities in Saving Fuel, Adopt Highest Types of Boilers, Stokers and Equipment To Reach Maximum Efficiency—Vast Field for Improvement—Experiments Show Need of Modern Installations

BY WALTER N. FLANAGAN

REGARDLESS of the relative cost in the finished product the power consumption in the steelworks is of such magnitude and the possibilities of saving so great that careful attention to the power and fuel problem is needed. The steelworks power plant, while usually compared with the central station on account of its magnitude, has more varied problems to meet than almost any other industry. More entirely different kinds of fuel have to be handled and the power equipment is usually more widely scattered and of a more diversified nature than will be found anywhere else.

Many kinds of efficiency are obtainable in a boiler house, some of which can be made to go hand in hand, while others are ordinarily opposed to each other. The principal kinds, those which most interest steelworks and power plant managers, are investment efficiency, fuel efficiency, labor efficiency and efficiency of product, which is usually looked upon as quality of product. It is now realized that the greatest fuel saving with present equipment can be obtained in the boiler room and that more care is needed to maintain that efficiency than anywhere else in the power plant. Efficiency of product is obtained in various ways, one of which is superheating the steam. Unfortunately there are two kinds of superheated steam, pure or clean steam and dirty steam.

Feed Water Problems

Clean feed water is obtainable only in a central station where condensate from surface condensers and evaporated make-up water are used for boiler feed. In a steelworks or power plant where a large percentage of the steam has to be condensed in jet condensers or scattered around a large plant, water with more or less dissolved salts and organic matter has to be used for boiler feed. While most of the scale-forming and the suspended and organic matter can be removed in a water-softening plant, considerable quantities of dissolved salts remain and unless the boilers are designed to produce and deliver dry steam to the superheaters, this moisture is evaporated and the dissolved salts carried into the lines as a powder to cause leaky valves, scored engine cylinders and rods, and reduced turbine efficiency by wearing or depositing upon the blades.

Since most of the boilers today are merely developments of the boilers built when 100 per cent rating was the maximum ever demanded and before the days of superheat, absolutely dry steam cannot be expected with dirty feed water and ratings of 200 per cent or more, unless special provisions are made for extracting moisture. Recently the increasing use of superheat has caused the advent of separating dry pipes, which are something more than mere steam collectors, and to the attempts on the part of some boiler manufacturers to design a boiler which will produce dry steam at high ratings. Drying tubes or heated steam circulating tubes, while producing dry steam, do not remove the dirt from it.

Investment, fuel and labor efficiency are all increased by the use of large boiler units as less space is required for a given capacity, the radiation loss is lower since the wall surface is less per boiler horsepower; with modern stokers or other fuel burners one man can handle one or more large units with almost the same facility as the same number of smaller units; and control apparatus, instruments, and attention can be applied to a large boiler at a much lower cost per boiler horsepower than to a small one, and these pay big dividends on a small investment.

Investment efficiency has been increased by running boilers at high ratings, 200 to 250 per cent now being common practice, with some plants being designed for 400 per cent or more. With stoker firing it is still a question whether 400 per cent is the limit, as operating troubles increase due to a deposit of sticky ash on the tubes, burning of tubes, priming, and melted, buckled or slagged brickwork. Most of the present types of boilers are unsuited, but except for the slagging of the tubes it is possible that certain boilers or improved designs can be run economically at ratings considerably higher than 400 per cent provided they are equipped with economizers. Slagging of the tubes could be avoided by properly burning pulverized coal. At very high ratings, even with ordinary boilers, induced draft fans have to be used.

The question of draft loss through the boiler brings to mind the question "Which type of boiler is best and most efficient?" This opens the way for argument and qualifying conditions, but it seems to be true that for a given heating surface, provided the water circulation is good so as to rapidly remove steam from the tube surface and prevent it from becoming steam bound, the efficiency is a function of the draft loss, and will be practically the same in any boiler for a given draft loss if the tubes are so arranged that the gases are brought into fairly intimate contact with them. This limits the selection of a modern boiler to the one that will generate the dryest steam, which is most easily cleaned and repaired, and which requires the least repairs.

Since a modern boiler plant has so many advantages over some of the older ones, not only in fuel economy, but in saving of labor, many of the older boiler plants are being, or are to be replaced. There is quite a saving to be made in most cases, even though the old boilers still have a life of from five to 10 years.

Contraction of Boiler Settings

The design of the boiler settings has become the subject of as much study as the open-hearth furnace. The setting of the boiler can limit its capacity and economy by limiting the flame temperature that can be maintained in the combustion chamber. Unless expansion and contraction are cared for, large cracks open up every time the boiler is cooled off, and even during operation, on account of the great difference in temperature between the inside and outside wall surface.

Expansion strains and the bulging of the walls have been partially taken care of by making the inside of the walls the concave side of an arch running either up and down or across the boiler and by using an occasional row of tile which extends through the entire thickness of the wall. These tiles tend to tie the inner and outer portions of the

From a paper read before the American Iron and Steel institute in New York, May 27, 1921. Mr. Flanagan is steam engineer at the Ohio works of the Carnegie Steel Co. at Youngstown, O.

wall together. The use of common or face brick in settings for large boilers has been practically eliminated.

Walls have been built completely of tile of sufficient length that only one row is required for the thickness of the wall, and with fair success.

Steel jackets or casings for boilers save their cost over ordinary practice in less than a year by helping to keep the brickwork in shape and eliminating air infiltration. The steel casing enables the air infiltration to be controlled and kept at a minimum. Plastic coatings may be had for boiler settings, which as long as they are kept in condition prevent excessive air infiltration and are well worth while; but they do not have the advantage of holding the brickwork in shape and it is hard to permanently close up large cracks with cement and plastics.

The brickwork in blast furnace gas fired boilers does not have to withstand the temperatures that are encountered in coal fired boilers, but air leakage has just as serious results upon efficiency so that steel casings are undoubtedly one of the best paying appliances that can be installed in a gas fired boiler plant.

Ten per cent difference in efficiency in a 1300-horsepower boiler amounts to $15,000 or more difference in fuel cost per year, while a complete steel casing could be installed for about $5,400. The figures are based upon ¼-inch plate, riveted and calked, and covering not only the four sides but also the top of the boiler. This would last as long as the boiler and require practically no repairs. A cheaper casing, which would save the above losses, could be installed for half that amount, but it would need considerable more attention.

Another feature which is very applicable to blast furnace gas fired boilers is the use of a layer of high-insulating material in the setting walls. On account of the comparatively low temperatures encounteted no cooling of the walls is required and, therefore, as much insulation as practicable may be applied, resulting in an increase of two or more per cent in boiler efficiency and paying large dividends on the additional investment. This investment is not large as the insulating brick usually replace an equal amount of firebrick. For coal fired boilers the additional insulation is not nearly so applicable, although installed in many plants.

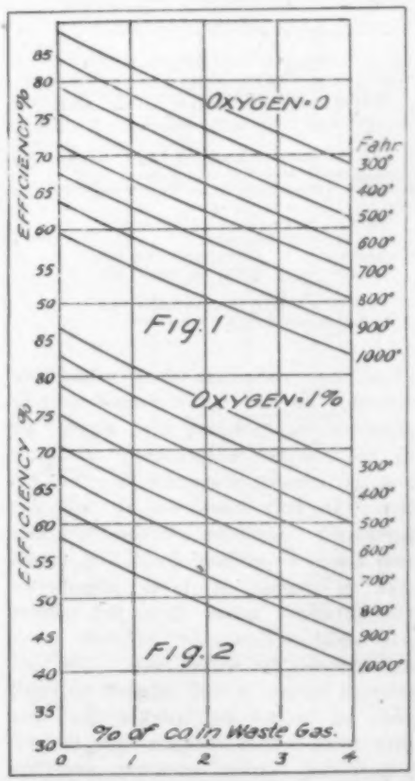
Tendencies in Design

It is becoming more and more realized that supporting steelwork has no place in the brickwork of the setting, as the brick and steel expand differently and drumheads, projecting through the setting, shift. Large cracks open up between the steel or drums and the brick. These cracks are next to impossible to keep tight unless inspected daily. The boiler of the future will have all drumheads inside the setting and all steelwork outside, thus avoiding these sources of excess air loss.

Only the best grade of firebrick obtainable should be used for the combustion chamber walls in a coal fired boiler as the slight difference in cost will be saved several times by freedom from repairs and operating trouble.

The fact that enormous quantities of heat are thrown away in steelworks is clearly recognized by everyone connected with them. Waste heat boilers early acquired a bad reputation in many plants, which upon analysis seems due, in addition to improper selection of equipment, to poor installations, cramped, dark and inaccessible locations, too light or too small fans, air leakage and poor auxiliary equipment.

Some of the more modern installations have been very successful on account of the following: (a) Proper location for room, access and repairs. Preferably grouping to insure attendance; (b) proper selection of boiler and setting with a view to obtaining an air-tight setting; (c) Use of steel jackets, or the coating of settings with plastic covering; (d) Selection of rugged fans and drives of ample capacity; (e) Installation of reliable accessories, such as feed water regulators in duplicate; (f) Attention to and means for cleaning; and (g) Installation of special boilers designed particularly for waste heat service.



FIGS. 1 AND 2—SHOWING EFFICIENCY OF A GAS FIRED BOILER, GIVEN THE TEMPERATURE AND THE CO AND O CONTENT IN THE BURNED GASES

The following analysis of blast furnace gas was assumed in calculating curves:
CO_2 — 12 per cent; H — 3 per cent; CO — 26 per cent; N — 59 per cent.
Moisture in live gas—12 per cent.
Heat value of live gas:
Calorific — 93 B.t.u. per cubic feet.
Sensible — 2 B.t.u. per cubic feet.
Total — 95 B.t.u. per cubic feet.
Radiation assumed as 5 per cent.

In most plants where the waste heat is not utilized, the boiler horsepower which could be developed has to be developed by burning coal. In the modern coal fired boiler plant the cost of the boilers and the settings amounts to only 20 per cent of the total cost of the plant. Waste heat boilers require no expensive buildings with coal bunkers, no coal and ash handling systems including the requisite space, and do not require wide spaces between boilers or between boilers and walls for operating. They also require no stokers, ash pits, or forced draft fans. Therefore, even if a coal fired plant can be operated at an average rating of 200 or 250 per cent and waste heat boilers can only average 70 per cent rating, it still pays from purely an investment standpoint to install waste heat boilers.

In considering the sources of loss in the boiler plant it is found that by use of proper gas burners, stokers, or pulverized coal burners, the efficiency of the plant can be brought to a very creditable point, but even with the best of fuel burning equipment and well baffled boilers there is still a theoretical saving of about 15 per cent and an actual saving of from 5 to 10 per cent of the fuel burned which can be obtained by the use of economizers. The only question is whether this saving can be obtained without too great an investment, or too great operating costs. The higher the steam pressure and the higher the boiler rating, or the poorer the fuel burning equipment, the greater is the saving by economizers. In practically every instance economizer surface costs less to install than boiler heating surface, and due to greater temperature difference transmits more heat per square foot than the last pass of the average boiler. Due to the heat transferred in the economizer, boiler capacity is increased and a smaller number of boilers are required.

The use of preheated air is not new, neither is the idea of its use in connection with boilers, but until recently it was very little considered probably on account of the low price of coal. The air heater for a boiler must not

be confused with the recuperator on a heating furnace, where extremely high temperatures make its life fairly short and require a fairly expensive construction, although even here it pays good dividends if properly taken care of. In connection with boilers the tubes are only required to handle gases at from 500 degrees to 750 degrees Fahr. as against 1300 degrees or more in a heating furnace.

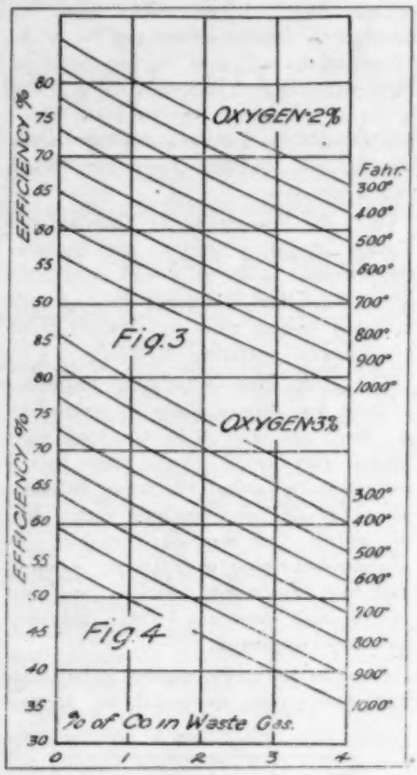
The advantages of the air heater over an economizer are cheaper and lighter construction, no pressure to resist, small building space, freedom from soot or dust, and safety. With fairly clean blast furnace gas no dust adheres to the tubes, if properly designed, if gas velocities of over 300 feet per minute are used and if the tubes are vertical.

The value of the air heater with stokers is still doubtful due to the fact that the air supply is used not only for combustion but also for cooling the metal parts of the stoker. Also with stokers there is the possibility of coking or caking the coal, fusing the ash, and of brickwork troubles due to high temperatures, which are eliminated with gas or powdered fuel. An air temperature rise of 300 degrees Fahr. is available, but due to the need of cooling the stoker parts, most power plant men hesitate to install air heaters in connection with stokers.

With blast furnace gas and powdered coal, however, full value may be obtained from preheated air with no increase in repair cost other than the upkeep of the air heater. As with economizers the higher the boiler rating and the higher the steam pressure, the greater is the saving by the air heater. More has been done in steelworks than anywhere else toward the use of air heaters and this holds good in boiler practice.

Development of Gas Burners

Increasing attention is being paid to burners. The ordinary burner found in many plants requires constant adjusting to proportion the air supply to the varying gas pressures. Even if this is watched closely, such burners do not attain thorough enough mixing to insure combustion before the gases strike the tubes, unless the combustion chamber is abnormally large, with consequent radiation loss. The unburned gases are chilled, thus either burning in the last pass causing high stack temperature, or causing high CO in the stack gases, with accompanying loss, or both. Recent burner development is along either of two lines: first, with an aspirating type of burner which uses the gas velocity to draw in the correct amount



FIGS. 3 AND 4—SHOWING EFFICIENCY OF A GAS FIRED BOILER, GIVEN THE TEMPERATURE AND THE CO AND O CONTENT IN THE BURNED GASES

The following analysis of blast furnace gas was assumed in calculating curves:
CO_2 — 12 per cent; H — 3 per cent; CO — 26 per cent; N — 59 per cent.
Moisture in live gas—12 per cent.
Heat value of live gas:
Calorific — 93 B.t.u. per cubic feet.
Sensible — 2 B.t.u. per cubic feet.
Total — 95 B.t.u. per cubic feet.
Radiation assumed as 5 per cent.

of air for combustion at all ratings; or secondly, an air fan combined with a regulator to automatically supply air to the burner independently of draft and in correct proportion to the gas flow. In both cases the air and gas ports are subdivided, giving alternate thin layers of air and gas. The second type of burner is fairly complicated and expensive where there are numerous small boilers, but is well worth the expense for large units. The aspirating burner is well adapted to small units as it can be installed for very little more than a common "gas feeder," requires no expert attention, and has no maintenance. For example, a 300 horsepower boiler at about 120 per cent rating equipped with goose neck burners, while running with 6 per cent oxygen showed 2 per cent CO in the stack and a stack temperature of over 800 degrees Fahr., or a boiler efficiency of approximately 46 per cent. Equipped with aspirating burners the same boiler averaged day after day 23 per cent CO_2, no CO and 600 degrees Fahr. stack temperature, giving a boiler efficiency of 73 per cent.

The curves in Figs. 1 to 7 show boiler efficiencies when burning blast furnace gas with various flue gas analyses and stack temperatures. They also show the efficiencies possible with good burners, proper baffling of boilers, and by economizers or air heaters. Seventy per cent efficiency is being obtained by modern burners under ordinary installations of small boilers, while higher efficiencies are obtained with larger units and boilers with longer gas travel.

The efficiencies shown at the upper left hand corners of Figs. 1 to 4 are readily possible with good burners and preheated air, the waste gases being used to heat the air for combustion.

Choosing the Proper Stoker

Several new makes of stokers have appeared on the market recently and at least three of these have been selected for steelworks installations. For burning coal underfeed stokers have been installed in most cases with a marked tendency to the extra long type. One of the most noticeable features is the use of air-cooled dead plates, wind boxes or side tuyeres, and of special brick with holes for air admission along the side walls, all of which are designed to protect the walls and avoid the use of steam jets.

For burning coke breeze, the accepted stoker seems to be the forced draft traveling-grate type. The mechanical difficulties of this type of stoker appear to have been solved, the greatest source of trouble being arches, other brickwork and ignition. Considerable experimentation has been done in plants equipped with traveling-grate stokers on arches when burning coke breeze.

In plants which have no coke ovens there is coke breeze, screened out at the blast furnaces, from which 200 to 300 boiler horsepower per furnace is obtainable. Many plants rather than install separate stokers are burning coke breeze on underfeed stokers or on hand fired grates with forced draft. It has been burned successfully on underfeed stokers either straight or mixed with coal. When burned without coal, coke breeze requires about three times the labor necessary for straight coal. However, mixtures of 25 per cent coke and 75 per cent coal are being burned with practically no additional effort.

While much credit for stoker development is due central station engineers, most of the low-grade fuel development has been accomplished in the steel works.

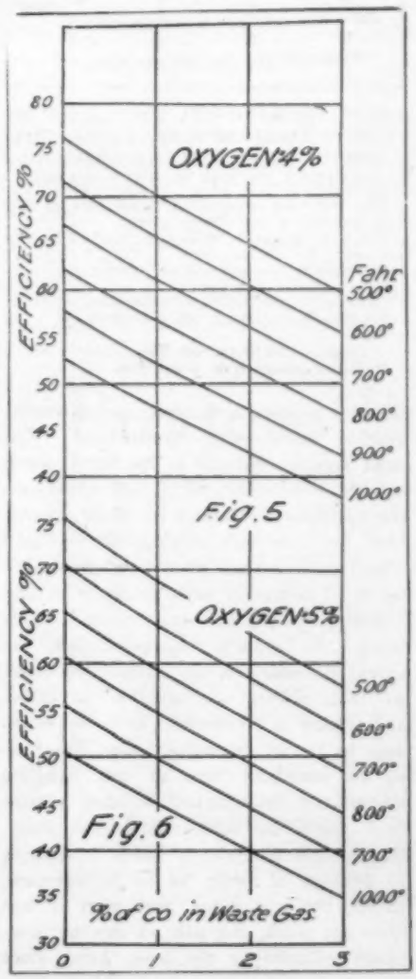
It has often been suggested that the future utilization of coal for power will consist entirely of the manufacturing

of coke in by-product ovens. This is entirely logical, but it is not as yet attractive to power plant owners on account of the tremendous outlay involved. Theoretically the next most nearly ideal way is to burn the coal in powdered form. With this system, cheaper buildings, excellent control, perfect mixing, and elimination of ash and excess air losses are obtainable, as well as extremely high efficiencies by the use of air heaters which are considerably less expensive than economizers. Due to operating difficulties encountered, these advantages are not being fully attained in boiler practice. When coal is burned with the theoretical amount of air, a very high flame temperature is produced, which is hard on brickwork and which liquefies the ash produced. To eliminate brickwork trouble, and also the liquid ash, which in earlier installations coated the tubes, large quantities of excess air were used which did away with some of the operating trouble, but also with one of the advantages, namely, increased efficiency due to the elimination of execss air loss, which amounts to from 5 to 10 per cent in an average stoker installation. No air heaters have been installed, which means another advantage lost.

The ideal and readily attainable installation will consist of a combustion chamber not any larger than for stoker practice, the burners being pointed downward allowing the flaflme and gases to reverse through 180 degrees before striking the tubes. The burner should be so designed that velocities above the critical will be obtained, which will give good mixing and perfect combustion with practically no excess air. The boiler should be equipped with integral air heater at the stack using the heat in the waste gases. The high flame temperature will slag a large part of the ash, which will be dropped into the bottom of the combustion chamber from which it can be run out in liquid form. The balance of the ash will pass through the boiler and out of the stack or can be removed from soot pockets in the setting in powdered form. The combustion chamber walls can be protected by passing the air from the air heater through them.

The present disadvantage of pulverized coal are: (1) Initial expense of the pulverizing plant; (2) Labor necessary to safely operate the pulverized coal installation is as great as for stokers unless the installation is very large; (3) Danger of explosion or spontaneous combustion; (4) Pulverized coal bins are required at furnaces or boilers; (5) Feeders and fans require power same as stokers; (6) Present feeders do not proportion correctly; (7) High cost of pulverizing: and (8) Coke breeze cannot be pulverized economically on account of its abrasive nature.

None of these difficulties are insurmountable, in fact most of them will be eliminated by apparatus just now emerging from the experimental stage. Disadvantages of initial outlay and labor are more than compensated for by the higher efficiencies obtainable if pulverized coal is properly burned. The cost of pulverizing is being decreased due to improvements in pulverizers. Much of the danger and all bins at the furnaces can be eliminated by circulating the coal in a solid stream through standard steel pipe by means of a pump and taking off what is needed by means of feeders, as the pipe passes the boiler or furnace. This eliminates expensive and space occupying bins and all danger of dust explosions or spontaneous combustion in the boiler house.



FIGS. 5 AND 6—SHOWING EFFICIENCY OF A GAS FIRED BOILER, GIVEN THE TEMPERATURE AND THE CO AND O CONTENT IN THE BURNED GASES

The following analysis of blast furnace gas was assumed in calculating curves:
CO_2 — 12 per cent; H — 3 per cent; CO — 26 per cent; N — 59 per cent.
Moisture in live gas—12 per cent.
Heat value of live gas:
Calorific — 93 B.t.u. per cubic feet.
Sensible — 2 B.t.u. per cubic feet.
Total — 95 B.t.u. per cubic feet.
Radiation assumed as 5 per cent.

There is also a flexibility and ability to meet peaks than can only be obtained otherwise with a gas or liquid fuel. The standby losses are very small as banked fires are not necessary and the boiler can be entirely closed up when not required, and kept hot for long periods. Low-grade fuels, which would cause trouble on stokers or with hand firing, can be burned with little difficulty in the pulverized form, as high sulphur, sticky or excessive amounts of ash can be disposed of in liquid form. The only limit is when coal contains so little volatile matter and so much ash or foreign matter as to render ignition difficult or impossible.

In the case of boilers fired with blast furnace gas pulverized coal furnishes an excellent fuel for standby service when the gas is off, since it can be fired in the same boilers as gas, and in the same manner.

The fact that stoker firing has made so much progress in power plants and pulverized coal so little is due, in addition to being unadapted to coke breeze, to slow development of pulverized coal apparatus, and not to a lack of realization of the advantages of pulverized coal. Apparatus that is adapted for boiler house use and requiring not too expensive an initial outlay is just being developed so that pulverized coal is more a feature of future than of present boiler plants.

Until the last few years conditions were tolerated in the boiler room which were eliminated in the engine room a century ago. The first steam engine had no automatic valve gear for feeding steam to the cylinders, but had a boy to operate the valves at each stroke. The engine had no governor, but on account of close attendance, slow speed and the fact that it did not have to operate in parallel with other engines, the governor was not as necessary as it is today. This is closely analogous to the boiler operation in many plants today and was the condition in all boiler plants a few years ago. The fireman and watertender had to feed coal by hand supposedly in proportion to a load of which they had no indication, they had to try and keep the boiler doing about the same as other boilers, but they had only a vague idea of what the other boilers were doing.

Stokers are the equivalent of the automatic valve gear of an engine or the blading of a turbine and assist in obtaining economy, capacity and uniformity. An automatic combustion control system for boilers is the same as the governor on an engine or turbine and just as necessary if fuel is to be burned econom-

ically, fluctuations followed and each boiler is to carry its share of the load.

A good control system is one which will supply fuel, air at the right pressure, and draft to carry away products of combustion, in exact proportion to the load all through the range of operation and which will vary the above at the exact instant at which the load changes occur, not several minutes later. While numerous attempts at automatic control have been made for years, it is only lately that systems have been devised and perfected which can co-ordinate and control the operation of boilers with any degree of exactness. The latest system uses direct current motor driven auxiliaries and, by handling only a quarter of one per cent of the total current used, controls the operation of the boiler with electrical precision and controls it directly by changing fuel and air supply in proper relation and in proportion to the load as changes occur, thus preventing inefficient operation and not merely correcting it after it has occurred. The dampers or induced draft fans in modern installations are now so controlled that the least possible draft necessary to carry away the products of combustion is used, thus reducing air leakage losses to a minimum, but at the same time avoiding a positive pressure in the combustion chamber which forces hot gases and flame into the brickwork causing deterioration.

Savings Effected Are Large

The savings to be effected in the boiler room are so great that even with automatic control and stokers a good man should be used in the boiler room just as a good engineer is needed in the engine room. The control systems in a large boiler plant pay close to 100 per cent on the investment in the saving of labor alone as the men are left free to watch the fires and not to act as governors, which results in better fires with fewer men, and high efficiency is continuous. On account of ease of control, close regulation and the constant speed characteristics obtainable in a motor, as well as better regulation of feed water temperature and economical regulation of exhaust steam supply, motor driven auxiliaries are being widely used.

Practically every system of control yet devised has been tried in the steel works power plant and every system on the market today is in operation in at least one steel works. The largest part of the development of boiler control has been done in the steel works of this country, urged not only by variable load and desire for economy, but also by adverse labor conditions.

Coal and ash handling machinery in the boiler house is usually a specialized

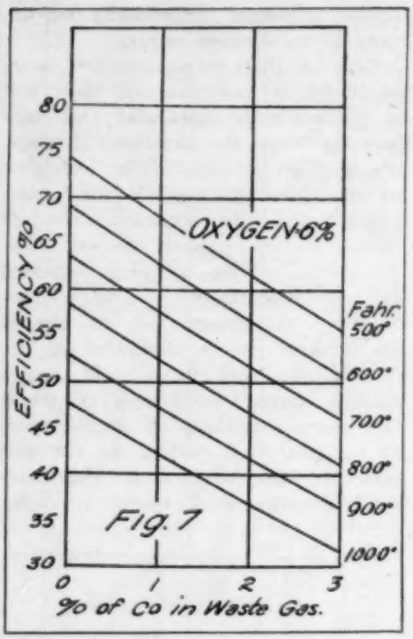


FIG. 7—SHOWING THE EFFICIENCY OF A GAS FIRED BOILER, GIVEN THE TEMPERATURE AND THE CO AND O CONTENT IN THE BURNED GASES

The following analysis of blast furnace gas was assumed in calculating curves:
CO_2 — 12 per cent; H — 3 per cent; CO — 26 per cent; N — 59 per cent.
Moisture in live gas—12 per cent.
Heat value of live gas:
Calorific — 93 B.t.u. per cubic feet.
Sensible — 2 B.t.u. per cubic feet.
Total — 95 B.t.u. per cubic feet.
Radiation assumed as 5 per cent.

form of hoisting and conveying machinery and is fairly well standardized. The most notable features in the latest plants are the widespread use of belt conveyors, the reliability attained by them, provision for thorough mixing of coal and coke breeze in some plants, and the installation of boilers at such an elevation that standard railway cars can be run directly under the ashpits. Large sliding ash gates, air operated, are usually installed so that poking or bridging of ashes and clinker is eliminated. It is not economy to tie an expensive boiler house up to an unreliable coal or ash handling system and the elevated building scheme is certainly the most reliable ash handling system possible, as there is nothing to get out of order or to be operated, except the ash gates, and even if one does not work, the ash pit can be practically emptied by the other gates, since two or more are usually installed under each boiler.

Many steelworks lose yearly, due to dirty feed water, the cost of a good water softening plant. Aside from the loss of efficiency due to scale, there is a high labor charge in cleaning and repairing and considerable loss of tubes, even if the water contains no corrosive substances. There is also a fuel loss in heating up boilers and deterioration of the settings due to shutdowns. In addition there is an investment in spare boilers which are necessary to permit others being cleaned and repaired, and which could be decreased if good feed water were available. The saving due to clean feed water does not end in the boiler house, but extends throughout the entire plant. The cost of clean feed water can be written off the books on either of two entirely different accounts. The first has been mentioned, the second is safety. Large investments are being made for safety and no industry has made greater progress than the iron and steel industry. An evaporator for make-up water for boiler feed is a standard piece of equipment in central stations except where corrosive water compels the use of jet condensers.

Some of the largest and best equipped water softening plants in this country have been installed in steelworks.

The saving in steam consumption due to superheat varies from ½ to 2 per cent for every 10 degrees Fahr. depending upon the design of the unit, being greatest for engines and small turbines and least for large turbines. Therefore, there is quite a saving possible in steelworks, where engines are widely used, the extent of which is limited by the ability of the engines to withstand the temperature.

The necessity of superheat in order to obtain full advantage of higher pressures as well as the economy obtainable with lower pressures and the use of superheated steam in coke and benzol plants for distillation, has resulted in superheaters being included in practically every new steelworks boiler installation and in many older boilers being so equipped.

Engines and Turbines

In order to obtain the economies of electric drive in the steelworks and to meet the increasing electrical demand, larger turbines are being installed than formerly. While there are no exceedingly large units in steel plants, still there are many installations of from 10,000 to 20,000 kilowatts, which sizes give good economy and compare quite favorably with central station practice. Units up to 45,000 kilowatts in a single casing and up to 60,000 kilowatts in a three casing machine have been installed in some of the largest stations, but turbines of this size are not required as yet for the steel industry on account of the immense amount of steam driven equipment in the plants and the desirability of having spares rather than tying all of the generating capacity up in one large unit.

While the turbo-blower, on account of the small turbine size and lower blower efficiency, cannot equal the economy of a gas engine or even the modern steam

engine, its other advantages of close regulation, accurate air delivery, and small space and labor requirements have caused its adoption in many plants.

For years the barometric condenser was the standard for steelworks on account of freedom from corrosion and repairs, and ability to use dirty water. This type of condenser, also, if properly designed can hold a fair vacuum even if the air pump is out of operation.

Even though the condenser condenses only a fraction of the total steam of the plant it will save the difference in cost in a short time from the feed water saving alone, by eliminating the necessity of treating that amount of water and, in case untreated water is used in the boiler, the saving will be at least double.

The modern blast furnace gas engine shows much greater reliability and a somewhat higher thermal efficiency than formerly, but the steam turbine plant when high pressures and superheat are used and all auxiliaries such as gas washers, are taken into consideration, runs a pretty close second in regard to economy and can be installed at a much lower figure. However, all of the possibilities of the gas engine have not been taken care of although some work has been done along this line in this country and considerable in Europe.

Practically every piece of power plant equipment has been tried and is in use in steel plants. The fact that some apparatus is not seen in all plants is not always due to carelessness or lack of efficiency, but quite often to its not being applicable to steelworks conditions. In almost every case, no matter what the present condition of equipment, the power problem is being seriously and scientifically considered and has reached as high a plane as any phase of industrial work.

Molybdenum and Its Use in Making Steel

(*Concluded from Page* 1525)

at higher drawing temperatures than those employed with other steels, a fact directly related to their greater toughness and resistance to fatigue.

It is in connection with this, the most important of all practical considerations, that the real commercial value of molybdenum is most evident. In the fabrication of an article from steel there are three fundamental operations: Forging or cold pressing, heat treating and machining.

Good "forgeability" is determined by the manner in which the steel flows, permissible range in forging temperatures and the extent to which the scale adheres to the steel. The molybdenum steels flow readily under the dies and possess a wider safe forging range. It is in the ability to "throw the scale," however, that their chief advantage in forging lies. The scale on nickel and chrome-nickel steels adheres strongly to the bar while that on the chrome-molybdenum comes off readily. Adhesion of scale during working naturally increases the prevalence of surface defects.

In sheet form, straight carbon molybdenum steel has proved to be—because of its great ductility—especially adaptable to parts which require extremely difficult forming operations. Also this steel can be treated to exhibit high strength and these qualities have made possible a much wider application of heat treatment to sheet metal parts.

A wide, safe heat treatment range is another characteristic of these steels. In hardening, a temperature variation of 200 degrees Fahr. is permissible, while in drawing, the properties fall off less rapidly and higher temperatures are used than with any other alloy steels.

For case hardened parts, molybdenum has the effect of greatly toughening the core and of adding hardness and wearing qualities to the case. It also has a very favorable effect as compared with nickel on the penetration of carbon in the carburizing process.

Basset Would Produce Low Cost Steel

European Staff Correspondence

PARIS, May 20.—In announcing the success of the method for making steel direct from iron ore, Monsieur Basset and his engineers who have been carrying on experiments behind closed doors at the Acieries Basset at Dennemont near Mantes on the Seine below Paris, made the statement that "The process now enters the realm of industrialism." By the way of comment on the process, Monsieur Basset stated: "After experiments carried out over a lengthy period in a 25-ton furnace at Dennemont, another furnace of 100-ton capacity has been erected at the same plant and is in production."

Doubt exists in some quarters as to whether the recent announcement is a matter of publicity or a genuine statement of progression in metallurgy, since placing of pulverized coal and ore in a rotating furnace has been known to American ironmasters for a generation. It is interesting to note, however, that Monsieur Basset, following an announcement of successes some months ago succeeded in interesting in his process a number of well known French industrial and financial experts. As to practical results, it is stated that standard rail steel ready for rolling actually was produced at Dennemont on the night of April 15. It is further stated that since that time the furnace had been interrupted in its production but once and then for minor repairs.

"I can obtain," said Monsieur Basset, "that which I wish from my furnace pig iron, forging iron or steel. It is necessary only to modify the composition of the charges according to rules which have been stabilized to produce various specialties of which the base is iron." Details of the process are still being held secret but it is known that the temperature of the furnace normally is 2000 degrees Cent. and that the coal consumed adds only heat to the furnace and its charge, no disassociated elements being thrown off as when the coal is burned in a blast furnace or an open hearth. Steel produced at Dennemont is said not to cost more than 110 francs per metric ton, a figure considerably less than steel produced by other methods.

The Acieries Basset stated that it is at the point of erecting four Basset furnaces of 250-ton capacity each on land which has been acquired adjacent to the Normandy ore fields and that these four furnaces can be fired three times a day and will produce 3000 tons of steel in 24 hours at a cost of production not to exceed 110 francs a ton based on present raw material and labor costs. The French inventor in the near future hopes to have a plant in operation near the eastern ore fields of France as well as in several foreign countries. It is estimated that each of the 250-ton furnaces will cost 2,500,000 francs.

In concluding comment on the process, Monsieur Basset stated that he could produce for the market 3000 tons of steel per day at a price lower than that of any competitor. With 400 francs taken as the average production cost of steel in the present day, the 110-franc figure named by Monsieur Basset is a considerable reduction.

Spot Needs

Result in Some Buying of Coal Tar Products—Prices Are Unchanged

New York, May 31.—Demand for naphthalene, which has been more or less erratic, is again coming out in good volume. Buying is all for nearby shipment, the drug trade figuring principally. Prices are unchanged at 8½ cents, f.o.b. works, for flakes, and 9½ cents, for balls.

Coke Oven By-Products

Spot

Per Gallon at Producers' Plants

Pure benzol	$0.27 to .33
Toluol	.28 to .34
Solvent naphtha	.25 to .31

Per Pound at Producers' Plants

Phenol	nominal
Naphthalene, flake	$0.085
Naphthalene, balls	0.095

Per 100 Pounds at Producers' Plants

Sulphate of ammonia	$2.40 to $2.50

Contract

Pure benzol	$0.27 to .33
Toluol	.28 to .34
Solvent naphtha	.25 to .31

Per Pound at Producers' Plants

Phenol	nominal
Naphthalene, flake	$0.085
Naphthalene, balls	.095

Per 100 Pounds at Producers' Plants

Sulphate of ammonia	nominal

A fair sized amount of benzol is also being purchased. During the past week, the rubber manufacturers have closed on a considerable quantity for nearby delivery. Toluol and solvent naphtha are being purchased by the lacquer and varnish people in fair amounts. The general situation, however, is far from active, with prices weak but unchanged.

Pure benzol for spot shipment is holding at 27 cents, f.o.b. works, for material in tanks, and 31 to 33 cents, in drums; 90 per cent benzol, at 25 in tanks, and 28 to 31 cents in drums, 34 cents in drums, and solvent naphtha, 25 cents in tanks and 28 to 31 cents in drums.

Some resale lots of sulphate of ammonia are being bought at around $2.25, f.o.b. shipping point. The first hands, however, are quoting at $2.50 f.o.b. works. Trading is all for nearby shipment and is small in the aggregate.

Shows Living Cost Drop

A decrease of about 1 per cent in the cost of living during April is shown in the report of the National Industrial Conference board for May 1. The decrease between July, 1920, and May 1, 1921, was 19 per cent, leaving a net gain since July, 1914, of 65.7 per cent. These figures are based on retail prices of the component elements in the family budgets, weighted according to consumption by average wage earners' families before the war and they are for the country as a whole. The greatest decrease reported in any of the major items in the family budget during April was for food. Average rents and the cost of sundries did not change; decreases in the cost of clothing and of fuel and light were insignificant.

News of Societies

Past and Coming Meetings of National and Local Trade and Technical Organizations

INSPECTION of the Windsor power plant of the Beech Bottom Power Co., Beech Bottom, W. Va., will be made by members of the Engineers Society of Western Pennsylvania, June 4. The present plant consists of four 30,000 kilowatt turbo-generator units with a total capacity of 120,000 kilowatts. The boilers are only a few hundred feet from the coal mines.

* * *

Lime Association Will Convene

Announcement is made of the third annual convention of the National Lime association to be held at the Commodore hotel, New York, June 13 to 17. Kiln efficiency, lime burning, and other lime production problems will be discussed. Sessions have been arranged for the study of the extension of the use of lime and accomplishments of the technical departments. Officers will be elected.

* * *

Explains Machine Tool Problems

An annual meeting of the Hartford branch of the American Society of Mechanical Engineers was held in Hartford, Conn., May 9. Earle Buckingham, Pratt & Whitney Co. spoke on rapid production in milling. A representative of the New Britain Machine Co. New Britain, Conn., covered the subject of production with screw and chucking machines, while a representative from the Bullard Machine Tool Co., Bridgeport, Conn., spoke on production with boring mills. The meeting was the last one of the season.

* * *

Detroit Foundrymen Elect

Members of the Detroit Foundrymen's association held an annual banquet at the Fellowcraft club, Detroit, May 19. This occasion marked the annual election of officers and the following were chosen for the ensuing year: President, Fred Erb, Packard Motor Car Co.; vice president, E. S. Van Dalson, Dodge Bros.; secretary, H. J. Brady, Aluminum Manufactures, Inc.; treasurer, J. R. Stewart, General Aluminum & Brass Mfg. Co. J. C. Woodison, the E. J. Woodison Co., and J. D. Stoddard, the Detroit Testing Laboratory, were newly elected members of the executive board.

Convention Calendar

June 3-4—National Hardware association of the United States, Metal Branch. Tenth annual meeting at the Cleveland hotel, Cleveland. George A. Fernley, 505 Arch street, Philadelphia, is secretary.

June 14-16—Stoker Manufacturers' association, Red Lion inn, Stockbridge, Mass. Date advanced from May 24 to 26. R. C. Beadle, Combustion Engineering Corp., New York, is chairman publicity committee.

June 15-16—Master Car Builders' association. Annual convention, Chicago.

June 20 to 24—American Institute of Chemical Engineers, spring meeting, Detroit.

June 20-24—American Society for Testing Materials. Twenty-fourth annual meeting at the New Monterey hotel, Asbury Park, N. J. C. L. Warwick, 1315 Spruce street, Philadelphia, is secretary.

June 20-25—American Institute of Chemical Engineers, semiannual meeting, at the Statler hotel, Detroit, Mich. J. C. Olsen, Polytechnic institute, Brooklyn, N. Y., is secretary.

June 22-24—American Drop Forge association and the Drop Forge Supply association. Annual joint convention to be held in Chicago. H. N. Taylor, 300 Chestnut street, Philadelphia, is president of the last named organization.

Sept. 12—National Exposition of Chemical Industries, in the Eighth Coast Artillery armory, New York.

Sept. 14-16—National Association of Cost Accountants, will hold its annual convention at the Cleveland hotel, Cleveland. The secretary's address is 233 Woolworth building, New York.

Sept. 19-24—American Society for Steel Treating. Annual convention and exhibition at the Manufacturers building, state fair grounds, Indianapolis. W. H. Eisenman, 4600 Prospect avenue, Cleveland, is secretary.

Oct. 17-22—American Mining Congress, will hold its twenty-fourth annual convention in the Coliseum, Chicago. Also national exposition of mines and mining equipment.

President May Cut Rail Rates

Business Revival Believed To Depend Upon Lower Tariffs Which Interstate Commerce Commission Appears Slow in Ordering—Carrier Ruling Affects Short Lines Serving United States Steel Corp. Subsidiaries

WASHINGTON, May 31.—Developments in the railroad and business situation appear to be shaping themselves in such manner as will prompt the President to seek an adjustment in rates and the rate structure long before the interstate commerce commission will order a reduction. It seems likely, too, that if the President is compelled to act he will entrust the task to Secretary Hoover.

In the bulk of discussion, the foreign situation in the past fortnight has outweighed the domestic situation, but the President and his cabinet are most concerned with internal affairs. From both the political and the practical standpoint the administration feels that it carries the responsibility for getting the wheels turning again. Several times the President has referred openly to the need for a readjustment of freight rates, while Secretary Hoover has been outspoken on this point.

From all outward appearances, the commerce commission will be most deliberate in revising rates. On the other hand, the cabinet believes business will be stimulated by a lowering, first, of rates on such bulk commodities as coal, wheat, ore and the like. It is felt here that almost any reduction will have a psychological effect because much traffic is held in the expectancy of a reduction. The President seems desirous to avoid all appearances of over-riding the commerce commission, yet it may be forced upon him.

Although the commerce commission steadily is making some readjustments, these revisions are ineffective. The announcement of the size of the wage cut, effective July 1, in a few days probably will give fresh impetus to the entire railroad situation. The proposed recasting of the department of commerce and discussion of the setting-up of a division of transportation within it are expected to aid in bringing matters to a head.

As the railroad hearings before the senate committee on interstate commerce approach the closing of testimony by the railroad executives, the more determined seems the resistance of the executives to a reduction. More and more emphasis is laid upon the proposition that rates cannot be reduced until expenses have been cut. This contradicts the belief that the present rates are heavier than the traffic will bear, and that a reduction will actually increase the net revenue.

Executives who have appeared before the senate committee also have been stressing the economies effected by the roads. Eighty-five per cent of the locomotives on the New York Central are equipped with superheaters, A. H. Smith, president of the road, declared, while 96 per cent of all locomotives fit to have them are so equipped. He also said that 98 per cent of the locomotives have brick arches. These improvements, he asserted, save 20 per cent on coal. According to H. E. Byram, president of the Chicago, Milwaukee & St. Paul, in the past two years his road has realized $2,268,000 from the reclamation of castings, springs, hose couplings and other material, most of which has been recovered from the scrap pile at small cost and put in shape again. In addition, in the past two years, the sale of scrap has brought $5,400,000 to the road.

Loading of ore in the week ended May 14 was 22,806 carloads, a marked increase from the 13,041 carloads of the week preceding, yet in the same week of 1920 the railroads loaded 51,355 carloads. With coke the story is quite similar. Loading amounted to 5126 cars in the week ended May 14, against 4626 in the preceding week, but in the same week of 1920 loading was almost twice as heavy, or 9899 cars. For all commodities, revenue freight loading in the week ended May 14 amounted to 750,158 carloads, compared with 718,025 in the week preceding and 843,145 carloads in the corresponding week one year ago. In the period May 8 to 15 the daily average surplus of freight cars was 450,453, compared with 471,922 in the period May 1 to 8. Of the 450,453 freight cars idle, 143,286 were gondolas, 59,062 hoppers, 10,434 coke cars and 170,595 box cars. On the Canadian railroads the surplusage was 45,920 cars.

A decision of importance to subsidiaries of the United States Steel Corp. has been handed down by the interstate commerce commission in the complaint of the National Tube Co. against the Pennsylvania railroad. The case involves the status of the Benwood & Wheeling Connecting railway and the McKeesport Connecting railway, serving the Benwood, W. Va., and McKeesport, Pa., plants of the tube company; the Mercer Valley railroad, serving the American Steel & Wire Co. and Carnegie Steel Co. plants at Farrell, Pa.; and also the relations of the McKeesport Connecting railway with the American Sheet & Tin Plate Co. plant at McKeesport. The commission's ruling in these combined cases is:

"The Mercer Valley railroad found not to be a common carrier subject to the interstate commerce act and its demurrage tariffs filed with this commission are without force or effect.

"The trunk line demurrage tariffs applicable to the detention of cars by industries served by the Mercer Valley railroad not shown to result in unreasonable or unduly prejudicial charges.

"The Benwood & Wheeling Connecting railway and the McKeesport Connecting railroad found to be common carriers subject to the interstate commerce act. Rules for car interchange between them and their trunk line connections and basis for settlement of accrued charges suggested."

American Steel Rusting

Washington, May 31—Large amounts of structural steel, wire, and miscellaneous steel products are piled up on the docks at Montevideo, Uruguay, rusting because of the absence of clearance, Commercial Attache Feely, at Buenos Aires, has reported to the bureau of foreign and domestic commerce. This material has practically been abandoned because of the high value of the American dollar at the time it was purchased. Scores of automobiles also are piled up on the Montevideo docks.

Prices of Packers' Cans

New York, May 28.—The American Can Co.'s list of prices on packers' cans is as follows: No. 1 standard sanitary cans $19.50; No. 2, $27; No. 2½, $34.75; No. 3, $36.50; and No. 10, $79, all f.o.b. shipping point. These prices have been in effect since April 20.

Readjustments Not Yet Complete

Opinion Prevails That Further Reductions in Production Costs and Money Rates and Restoration of Price Balance Between Industries Necessary — Fundamental Conditions Continue Improvement

BY JOHN W. HILL, FINANCIAL EDITOR

CONSIDERABLE progress is being made in the improvement of fundamental conditions, but complete recovery of business awaits further adjustments of wages, prices, freight and money rates, living costs and, above all, the restoration of a relative parity in the prices of various industries. This is the essence of the view of the outlook as expressed by leading iron and steel men at the American Iron and Steel institute meeting last week. It is also the testimony of the barometers of trade used by economists and statisticians in forecasting the future.

In some important directions the necessary adjustments seem near consummation. The improvement in the credit situation has gone far enough to bring easier money actually within sight. Railroad earnings and loadings are gaining and the announcement of a wage cut by the railroad labor board this week offers the prospect of lower rates.

With the harvesting of farm crops at lower production costs and with falling industrial costs and prices continuing it seems likely that in the next few months the prices of farm products and industrial goods will be more nearly on a common level than they have been in many months. This will tend to restore farmers' buying power, depletion of which now stands as one of the greatest barriers to prosperity.

The betterment in the financial situation was prerequisite to improvement in business conditions. That the credit tension is growing less severe is evident from the gains in the reserve position of the federal reserve system. This gain is being accomplished by gold imports, which have added more than $439,000,000 to the holdings of the system in a year. Rediscounts also are less. In addition the federal reserve note circulation has dropped $670,000,000 from the peak, or fully 20 per cent.

Banking authorities consider a 60 per cent ratio of cash to note and deposit liabilities of the reserve system as providing an ample margin of safety. Last week the ratio reached 57.6 per cent compared with about 43 per cent one year ago. This lends significance to the recent assertion of Gov. W. P. G. Harding of the federal reserve board that the "reserve banks are now able to aid in the movement to stimulate trade" and to the prediction of easier money rates this summer by Secretary Mellon.

Of outstanding importance is the announcement of lower wages for railroad employes. The railroads should be able to effect a vast saving during the latter half of the year, from the lower wages and from the abrogation of the national wage agreements. All indications point to the fact that the railroads have touched bottom and are on the upgrade.

Improvement in Earnings Shown

April reports which have been made by a few leading companies show continuance of the improvement in earnings and reductions in operating expenses. The roads recently have been reporting lower gross but increased net. This has happened on only three previous occasions since 1900—in 1904, in April, 1908 and May, 1915. On each of these occasions this development was the precursor to a great bull market, which was the forerunner of business recovery.

Another interesting phase of the railroad situation is the fact that loadings at present are running at 88 per cent of the corresponding date last year. Two months ago the loadings were 75 per cent of 1920. The gain in loadings for the week ended May 14 was 32,133 cars to a total of 750,158.

The decreases from one year ago in car loadings, in bank clearings, in the building industry, and various other indices of general business, are less than the slump in the steel industry. This leads many to believe that the curtailment of demand and production in this industry is out of proportion and therefore temporary. Some look for a quicker comeback in steel than is now generally expected in the trade.

The outlook for immediate sweeping wholesale reductions of freight rates is not encouraging. It is believed, however, that adjustments in many specific cases will take place without great delay. The railroads themselves have indicated their willingness to make these moves and in fact such adjustments have already been made in a number of cases.

Further wage reductions in many industries are bound up with living costs. In the iron and steel industry, however, wages are still about 90 per cent above prewar levels, while living costs are only 65.7 per cent above. Although wholesale prices have been falling, drastically in some cases, the cost of living decline has been slight in the last few months. According to the index of the National Industrial Conference board the drop of living costs on May 1 was only 1.1 per cent from April 1.

Analysis of the cost of living situation discloses that the level is being held up by the failure of rents and fuel to recede. The cost of shelter on May 1 was 8.2 per cent higher than in July, 1920, when all living costs touched the peak. Food has fallen 30 per cent and clothing has fallen 36.8 per cent. Fuel is still virtually at the 1920 peak.

Lower tax burdens are indicated by England's announcement of her intention of beginning payment of interest on her American debt. This will amount to about $250,000,000 annually President Harding at a conference with leading bankers last week made it plain that all loans extended to foreigners should be conditioned on the purchase of goods here or the paying of debts.

The administration has announced a plan of funding the foreign debt. The European outlook has brightened with the victory of Premier Briand in his fight for a policy of moderation. This gives a new promise of European stability, with its certain stimulation of American trade.

A month or so ago the activity of the automobile trade was the outstanding factor in the industrial situation. This is now seen to have been largely seasonal and auto plants are beginning to curtail production. Nearly a dozen manufacturers have announced price cuts of from 8 to 30 per cent and further reductions

are expected. Leading tire companies have also announced curtailment of operations.

Hydraulic Steel To Buy Detroit Company

A meeting of the stockholders of the Hydraulic Steel Co., Cleveland, has been called for June 24 to vote on the proposal to merge the company with the Detroit Pressed Steel Co., Detroit. The Hydraulic company has an option on the common stock and Series A shares of the Detroit company. The plan, by which the companies will consolidate, includes the authorization by the Hydraulic stockholders of a second preferred stock issue.

The Detroit Pressed Steel Co., manufactures frames for automobiles, a single disk wheel under the trade name of "disteel" wheel, rims and brake drums. Its net worth is approximately $5,100,000 from which should be deducted $600,000 of bonds and $1,500,000 of preferred stock. The company consumes between 30,000 and 40,000 tons of steel annually and would provide a market for the surplus of the Canton steel plant of the Hydraulic Steel Co.

The details of the transaction call for the exchange of three shares of common and stock of the Hydraulic company for four shares of common stock of the Detroit company. This will require the issuance of 54,300 shares of the Hydraulic stock and $350,000 of second preferred which of Series A common of the par value would be exchanged for 50,000 shares of $1,250,000 of the Detroit company.

Directors of the Hydraulic company are asking stockholders to approve an issue of $2,750,000 of second preferred stock. Of this sum $850,000 will be used to acquire the Series A stock of the Detroit company. The additional $1,900,000 will be used to buy the preferred stock or acquire other property advantageous to the company.

Lackawanna Steel Co. Passes Dividend

Following recent similar action by the Republic Iron & Steel Co., and the Cambria Steel Co., the directors of the Lackawanna Steel Co., have passed the quarterly dividend on common. The decision reflects the current depression in the trade which is causing low operations and depleted earnings.

During the first quarter the company earned $8736 before dividends and operating results during the second quarter are expected to show no improvement. The initial dividend of 1 per cent on the company's common stock was paid in January, 1913. None was paid thereafter until September 1916 when the stock was placed upon a 6 per cent basis. This was maintained until the present. During the war and down to January, 1918, the company paid extra dividends during four quarters ranging from 2½ to 3 per cent.

Oppose Dominion Merger

A bill to ratify agreements entered into by shareholders of Dominion Steel Corp., Ltd., and Nova Scotia Steel & Coal Co., Ltd., with British Empire Steel Corp., is before the Nova Scotia legislature. Criticism has developed, it being contended that insufficient safeguards were provided against exploitation of the province's greatest asset, its coal fields. Opponents of the bill succeeded in having it sent to law amendment committee, where it will be considered along with a new amendment to the mines act.

Penn Reports Deficit

The Penn Seaboard Steel Corp. has submitted a report for the first quarter to the New York stock exchange which shows a deficit after charges of $230,895. Gross sales totaled $486,-756. Cost of sales and expenses amounted to $589,983. Other income was $5304. Interest and bond discount were $132,972.

Iron Mines Operate Reduced Schedules

DULUTH, May 16.—Officials of mining companies operating on the Minnesota ranges are unable to obtain a definite line on probable future iron ore requirements of the eastern furnaces. Only a few independent mines on the three ranges are producing or shipping and the season is the most backward of any in the experience of the operators. Dwight E. Woodbridge, mining engineer, estimates this year's shipments will not exceed 35,000,000 tons. Another authority places the aggregate at not more than 30,000,000 tons. J. H. McLean, general manager, Oliver Iron Mining Co., said:

"Estimates of ore shipments at this juncture are the purest guesswork. No information is at hand on which any figures can be based intelligently. It is quite possible that the demand for ore may pick up after midsummer. We have seen that happen in other seasons."

While the Oliver company operated its underground mines at nearly a normal rate all winter, it curtailed work recently. The usual tonnage of ore was stockpiled during the winter. It is estimated that the company's shipments from the head of the Great Lakes will be at least 20 per cent less than they were last season, when they totaled more than 20,000,000 tons.

Ten of the Oliver mines, including the Hull-Rust, Sweeney, Burt-Sellars, Morris, Philbin, Clark, Chisholm, Chester, Wellington, and part of the Missabe Mountain, began shipping when the navigation season opened. Contracts for the Oliver company's new screening plant to be built near Coleraine, Minn., have been awarded to the H. R. McQueen Contracting Co. at approximately $75,000. Work has been started. Coarse rock will be taken out of the ore at the new plant before the ore reaches the Trout Lake concentrator. Previously the rock was left in the pit.

Five mines on the Vermillion range, the Zenith, Pioneer, Sibley, North and South Chandler are working.

The Cleveland-Cliffs Iron Co. has closed its Boeing underground mine at Nashwauk because of the lack of demand for nonbessemer ore. Its Crosby mine at Nashwauk also has suspended operation.

Officials of the Shenango Furnace Co. estimate that shipments from its three mines will not aggregate more than one-tenth of last season's tonnage. It is expected that the company's Shenango pit will remain idle all season, unless trade improves early.

Earl H. Hunner, manager of mines for M. A. Hanna & Co., asserts that his company hopes to make a fair volume of shipments from its properties after June. The company's Alexandria mine has been closed for some time, but work has been resumed at its Leonard No. 2 mine.

Shipments will not be made by the Mesabi Iron Co., from its plant at Babbitt, Minn., before the spring of 1922, instead of this summer, as formerly expected, according to semiofficial announcement.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

DEXTER S. KIMBALL, manager of the American Society of Mechanical Engineers and dean of the college of engineering, Cornell university, was nominated for president of the society at its spring meeting held in Chicago, May 23 to 26. He has been active in the work of the society and a member since 1900, having been chairman of the com- a member of the committee on organization. He also is vice president of the Federated American Engineering Societies. He was born in New River, N. B., Canada, in 1865, and was graduated from Leland Stanford Jr. university in 1896. He served his apprenticeship with Pope & Talbor, Port Gamble, Wash., and in the shops of the Union Iron Works, San Francisco. He became designing engineer for the Anaconda Mining Co. in 1898. He was assistant professor of machine design at Sibley college, Cornell, for three years and then became works manager of the Stanley Electric Mfg. Co., Pittsfield, Mass. He returned to Cornell in 1904 as professor of machine design and construction and in 1915 was given the chair of industrial engineering. Dean Kimball in 1911 was a member of the council of industrial education for New York state and is a member of the Society for the Promotion of Industrial Education. With John H. Barr he is the co-author of *Elements of Machine Design* and author of *Industrial Education, Principles of Industrial Organization* and *Elements of Cost Finding.*

Lowell W. Abbot and Ray B. Smith have withdrawn from the Steel Products Equipment Co., Boston.

Larry Hathaway, formerly with A. M. Castle & Co., Chicago, has joined the sales forces of the Lincoln Steel Co., 112-118 North May street, Chicago.

William H. Woodin, president of the American Car & Foundry Co., has been elected a director of the American Beet Sugar Co.

Dr. Homer Gage, president of the Crompton & Knowles Loom Works, Worcester, Mass., has been elected president of the Massachusetts branch of the American College of Surgeons.

Charles F. Brooker, president of the American Brass Co., Waterbury, Conn., has been re-elected president of the New Haven Anti-Tuberculosis association.

Clement F. Poppleton, 805 Duquesne way, Pittsburgh, has been appointed consulting engineer for the Iron & Steel Products Co., 230 Fifth avenue, and the Hanlon-Gregory Galvanizing Co., both of Pittsburgh.

A. Giraud Foote has been made resident manager of a new branch office opened in the Pennsylvania building, Philadelphia, by the Iron Trade Products Co., Farmers Bank building, Pittsburgh.

William J. Wickes, president of the Wickes Boiler Co., Saginaw, Mich., has been made vice president of the new Ruggles Motor Truck Co., which has taken over the plant of the Saginaw Shipbuilding Co., Saginaw, for its factory.

Donald Tulloch, secretary of the Worcester, Mass., branch of the National Metal Trades association, will sail May 28 to attend the International Association of Rotary club's convention in Edinburgh, the week of June 12.

S. H. Truitt, Land Title building, Philadelphia, has been made manager of a Philadelphia district sales office opened by the Bayonne Bolt & Nut Co., Bayonne, N. J. Mr. Truitt formerly was district sales manager at Philadelphia for LaBelle Iron Works, Steubenville, O.

William Fellowes Morgan has been elected president of the Merchants Association of New York for a seventh term. James Gilbert White, president of J. G. White & Co., was elected second vice president, and William Hamlin Childs, chairman of the executive committee of the Barrett Co., third vice president.

T. J. Gillespie, president of the Lockhart Iron & Steel Co.; Arthur G. Pierce of the Cutler-Hammer Mfg. Co.; J. B. Rider of the Pressed Steel Car Co.; A. B. Shepherd of the Jones & Laughlin Steel Co., and A. L. Humphrey of the Westinghouse Air Brake Co. were among the 14 new directors recently elected by the Pittsburgh chamber of commerce.

C. C. Chambers, sales manager of the E. F. Hauserman Co., Cleveland, steel office and factory equipment, and E. H. Whitlock, president of the Whitlock Mfg. Co., Cleveland, have been made directors of the Service Savings & Loan Co., East Twelfth street and Payne avenue, Cleveland, formed by a group formerly in the military service of the United States.

Christopher Scaife has resigned as personnel director of the Graton & Knight Mfg. Co., Worcester, Mass., to become president of the Scaife Health Institute, Inc., of that city, which he has just organized.

William Pestell, western sales manager of the Sanford Riley Stoker Co., Ltd., Worcester, Mass., and its subsidiary, the Murphy Iron Works, Detroit, has been made manager of the recently combined sales departments of both companies. His new headquarters are at 1226 Woolworth building, New York. Other changes in the consolidation are the appointment of W. L. Bigelow as district manager at Pittsburgh, and C. Lincoln Smith manager of the Cincinnati district.

Bradley Stoughton's resignation as secretary of the American Institute of Mining and Metallurgical Engineers, which office he has held since 1913, has been accepted by the institute's board of directors. He will termine his services after a successor is elected and has become familiar with the work. In accepting Dr. Stoughton's resignation, the directors of the institute formally expressed their recogntion of the benefits which his work has brought to the institute. The statement also records the growth of the institute under Dr. Stoughton from a membership of 3500 in 1912 to more than 9000 at this time. It points out that the only technical committee in 1912 was the iron and steel committee, whereas 18 committees now cover the various departments of the institute's field. The number of local sections in that period has been increased from four to 26. Dr. Stoughton previously had sought to retire as secretary of the institute. but had been persuaded by the directors to defer such action. In his letter of resignation, he pointed out that when he assumed the office in 1913, it was at a loss of several thousand dollars per year income.

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

OFFICIALS of the Weidley Motors Co., Indianapolis, are planning a production of 14,000 engines for 1921, and in order to produce according to the schedule, approximately 4900 tons of raw materials will be purchased. By the end of the year the company plans to employ about 750 men. An export business of two per cent was done by the company last year and as soon as foreign exchange rates in Europe are stabilized, efforts will be made to increase this. The company is selling its product to 22 companies at present. It will continue to specialize in engines for automobiles, but intends spending some effort in the development of its tractor department.

* * *

WORD has been received to the effect the Lucius Steel Tank & Welding Co. plans to erect a plant at Uhrichsville, O., to be devoted to the manufacture of steel tanks, grave vaults and cement mixers.

* * *

ANNOUNCEMENT has been made of the purchase of the Champion Roller Milling Co.'s building in Richmond, Ind., by the Pilot Motor Car Co. of that city to be used either as a warehouse or an assembly building.

* * *

OFFICERS recently were elected at a meeting of stockholders of the National Machinery Co., Tiffin, O. They were: President, M. Frost; vice president, Mrs. K. J. Rohn; secretary, Earl Frost, and treasurer, W. L. Hertzer.

* * *

THE Cortland Grinding Wheel Co., Cortland, N. Y., whose plant was damaged by fire last November, has combined its business with the Maxf Grinding Wheel Corp., Chester, Mass., where the products of both will be manufactured.

* * *

THE Hudson Mfg. Co., Inc., Minneapolis, manufacturer of machinery and garden tools, recently was authorized to increase its capital stock from $1,200,000 to $2,000,000. Officers of the company are: President, H. D. Hudson, and secretary, J. C. Siebold. Plans of the company have not been made public.

* * *

COMPLETION of its new plant and general offices at Michigan City, Ind., has been announced by the Steel Fabricating Corp., and the removal of its facilities to that city from Harvey, Ill. The new plant with its 175,000 square feet of additional floor space more than trebles the company's former manufacturing capacity.

* * *

ADVICES have been received from the Kentucky Electric Lamp Co., Owensboro, Ky., to the effect the recent increase in its capital stock was made to finance its rapidly growing business. This does not mean that any plant enlargements or the installation of additional equipment is planned.

* * *

A PRODUCTION schedule of 18,000 engines is being planned by officials of the Mid-West Engine Co., Indianapolis, and it is planning to engage in the export business. Engines for 15 companies are being made by the firm and it is planning to have 1800 men employed by the end of the year.

* * *

AUTOMOBILE tools and part will be manufactured by the Triangle Steel Products Co., Michigan City, Ind., recently organized. H. C. Jostes, C. A. Kurrash and L. J. Finske, all of Michigan City, organized the company with a capital stock of $150,000, $100,000 of which is preferred stock The company plans to begin production this summer.

* * *

THE Penelec Coal Corp., Johnstown. Pa., has been organized by the merger of the Penelec Coal Co. and the Conemaugh Smokeless Coal Co., two of the largest companies in Johnstown district. The entire output of 18,000 tons annually which will be greatly augmented will be diverted into the channels of the Penn Public Service Co.'s huge power plant at Seward, Pa. The Penelec was incorporated in May 1917 with $600,000 capital stock while the Conemaugh Smokeless Coal Co. was capitalized at $650,000. Officers are: President, F. T. Hepburn; vice president, P. J. Morrissey; secretary, L. A. Wood and treasurer, A. E. Walbridge. Directors are John W. Walters, George T. Robinson, S. C. Pohe, P. J. Morrison and W. A. Reiber.

* * *

AN ANNOUNCEMENT has been made by C. H. Braden, Grosse building, Los Angeles, secretary and general manager of the National Airless Tire Co., to the effect preliminary plans are now being prepared for the erection of a plant for the company to be constructed at Norwalk, Cal., and it is expected actual work on the construction of the structure will be started in the near future.

* * *

BANKRUPTCY court at Milwaukee has granted J. F. Gerdis, trustee of the John Obenberger Forge Co., that city, permission to resume operation of the company's plant in West Allis, Wis., which has been closed for the past five months. The company now has an accumulation of orders on its books for crankshafts and similar automobile forgings.

* * *

WILLIAM H. McDaniels, president and manager of the California Iron Yards, Inc., Sixteenth and Missouri streets, San Francisco, recently announced that the company will engage in the general jobbing business and will handle a complete line of merchant and reinforcing bars, sheets, shapes and plates. A warehouse will be erected at Sixteenth and Missouri streets, and plans for the structure are now being drawn.

* * *

FIRE at the plant of the American Car & Foundry Co., Terre Haute, Ind., damaged the blacksmith and machine shops comprising about half of the entire plant. The walls of the two shops, which were housed in a section of the plant about 150 feet long, were all that was left standing. Expensive machinery and tools were ruined. The fire was the second heavy loss suffered by the plant during the last two years. In the fall of 1919 fire damaged the west section of the plant, which later was rebuilt.

Engineers Discuss Many Topics

Diversified Program of Chicago Meeting of American Society of Mechanical Engineers Includes Papers on Machine Shop Practice, Industrial Waste, Power, Fuel, Transportation and Education — Officers Nominated

FROM the standpoint of attendance and interest displayed in the technical program as well as in the discussion of association affairs, the convention of the American Society of Mechanical Engineers held last week at the Congress hotel, Chicago, outranked all previous Spring meetings. For the first time in the history of the organization, the program was entirely under the direction of the various professional sections, and the success of this plan was indicated by the fact that standing room only was available to those arriving late at many of the meetings. The registration totaled more than 1100 on Thursday.

The opening session Monday afternoon was devoted to the discussion of business of the society. The proposed new constitution, which is intended to simplify the present text by transferring some matters to the by-laws, was discussed in detail and will be subject to further amendment at the next meeting before being put to the vote of the members.

Four sessions, held simultaneously Tuesday morning, were devoted to fuel, machine shop practice, management and general topics, and in the evening the subject of training for industry was discussed. Wednesday morning a large group of engineers participated in a meeting on problems affecting Chicago, held under the auspices of the Chicago section of the American Society of Engineers in co-operation with the Western Society of Engineers. Other sessions held at the same hour were devoted to general topics and to a public hearing on power test codes. Four meetings were held Thursday morning on railroad, materials handling, forest products and power. Many engineers went to Davenport, Iowa, Friday to visit the Rock Island arsenal at the invitation of the ordnance department of the United States, issued through Maj. Gen. C. C. Williams, chief of ordnance. Several papers on ordnance problems were presented at a meeting held Friday afternoon.

The afternoons at Chicago were given over to plant inspection, more than 20 institutions in the Chicago-Milwaukee district opening their doors to visiting engineers. An informal dance was held Wednesday evening at the Congress hotel.

Lack of Common Terms Is Handicapping Work

UNUSUAL interest was evidenced in the session of industrial management, held Tuesday morning under the auspices of the management division. L. P. Alford, editor *Management Engineering*, New York, presided as chairman. The meeting was devoted largely to committee reports and the discussion of the problem of preventing waste in industry, which will be the keynote topic of the December meeting of the society.

Mr. Alford read the report of the executive committee of the management division, which is a resume of the work accomplished during the past year. Management is defined as the "art and science of preparing, organizing and directing human effort applied to control the forces and to utilize the materials of nature for the benefit of man." According to the report, the management division has the choice of the following activities and already is engaged in some of them: Standardizing management terminology, units of measurement, methods of measurement and methods of expression; improving and developing management education; eliminating management wastes in industry; eliminating unnecessary fatigue in industry; and promoting management research. The remainder of the report deals with the joint activity of the division in co-operation with other societies.

Favorable discussion of this report was followed by the tentative report of the joint committee on management terminology presented by F. E. Town, New York, chairman. Mr. Town briefly explained the work being done by the society in conjunction with representatives of the Industrial Relations Association of America, National Association of Cost Accountants, Society of Industrial Engineers, American Institute of Accountants and the Taylor society. In the ensuing discussion, the needs of uniform interpretation of standard terms was emphasized and existing discrepancies instanced.

Urges Standards in Graphical Records

The necessity of adopting standard practice in management was again mentioned in a paper on "Graphical Methods", by W. C. Marshall, New York. Standardization of diagram forms, he claims, would facilitate comparisons of results plotted by different investigators on the same subject. Mr. Marshall advocates courses in schools and universities covering the use and construction of graphical diagrams and the theory of graphical methods. He described many types of diagrams in frequent use and mentioned the advantages of the alignment form.

Robert W. Kent, consulting engineer, New York, emphasized the necessity of choosing the proper units of measurement in plotting charts and cited an instance where graphical diagrams based on payroll hours proved much more valuable than those based on cost of product. Another speaker advocated the use of colors, stating that frequently charts can be made clearer by coloring the principal lines.

The outstanding feature of the session was the address on "Industrial Waste" by L. W. Wallace, executive secretary, American Federated Engineering Societies, Washington, D. C. Mr. Wallace introduced the subject by referring to the tremendous losses incurred in catering to the craving for following rapidly changing styles in clothing. In one case, he said, a manufacturer of men's clothing saved enough by refusing to adopt a trivial alteration in the lapel of a coat to keep his plant operating near capacity while his competitors who accepted the change were forced to curtail operations sharply. Thousands of dollars are lost annually because some

architects and contractors insist upon building elevators as an afterthought instead of designing large buildings to accommodate the elevators. A locomotive builder recently built 163 standard locomotives in five weeks and in a similar period and under identical operating conditions could turn out only 104 locomotives of individual design. Mr. Wallace assailed the abuse of the practice of bidding on construction work, stating that in many cases, the owners of buildings are charged enough to cover the cost to contractors of submitting unsuccessful bids.

Mr. Wallace then outlined the work of the committee on the elimination of industrial waste inaugurated under the direction of Herbert Hoover. The work began Jan. 3, 1921 and covers 200 plants in nine distinct branches of industry. The report of the investigation will be ready June 3 and will be published in book form some time in the fall.

The work is considered as being preliminary to a long-time study of continuous process manufacturing which will cover practically all industries.

In his closing remarks, the speaker enumerated the benefits to be derived from the investigation, stating that the questionnaire alone, with its 58 main topics and 260 leading questions, is of value to every manufacturer in aiding him to inventory the problems existing in his own establishment.

The last part of the session was devoted to a discussion of a paper on the organization of an engineering society, by M. L. Cooke, consulting engineer, Philadelphia, which had been presented Monday afternoon at the business session. Mr. Cooke considers the changing conditions surrounding engineering societies and emphasizes the urgent need of increasing the interest and activity of the individual member. Professional solidarity, he states, is the first requisite in order to take advantage of the present opportunities for public service.

In discussing this subject, charts were displayed showing the present plan of organization of large engineering societies and proposed plans intended to remedy present evils. The consensus of opinion seemed to favor individuals as against committees for executive functions, largely because of the sluggish and unwieldy character of committees.

Automobile Influences Design of Machine Tools

TUESDAY morning's session on machine tool problems, which was held under the auspices of the machine shop practice division of the society, proved to be one of the most interesting features of the program. The meeting was devoted almost entirely to a discussion of the influence of the automobile on the machine tool industry. F. O. Hoagland, Reed Prentice Co., Worcester, Mass., presided as chairman.

In the absence of F. K. Hendrickson, Worcester, Mass., Prof. Forrest E. Cardullo, G. A. Gray Co., Cincinnati, read the former's paper on the influence of the automobile on the machine tool industry in general. Mr. Hendrickson's paper contains an outline of the changes induced by the automobile industry in materials for machine tools, precision and specialization, power, manipulation, speed, lubrication and safety devices. Lathe spindles, he declares, are now made of 0.15 to 0.20 carbon steel instead of 0.30 to 0.40 carbon steel and the diameters have been increased. Hardened steel gears have replaced cast iron gears, and bronze metals superseding babbitt in journals or bearings. The rapid development of precision grinding machines is largely due to the demands of the automobile, according to the author. Machines are being designed for more powerful drives, and feed and speed changes are accomplished more easily than heretofore because levers and hand wheels are being more conveniently located on tools. These changes, together with multiple tools and other devices, have enabled plant managers to increase the speed of production.

In a written discussion on this paper, Luther D. Burlingame, Brown & Sharpe Mfg. Co., Providence, R. I., enumerated the improvements on milling machines made possible by the demand for these machines by automobile manufacturers. He also emphasized the effect of the motor car industry on the development of grinding machines, stating that it would be practically impossible to achieve present results without grinders. He explained how the use of gages and small tools has been extended in the past few years because of the requirements of automobile builders.

J. A. Smith, General Electric Co., Schenectady, N. Y., stressed the importance of the proper distribution of power in a machine tool. The parts should be designed so that the drive will fail before a casting or other fixed part of the machine breaks. He declared that the lack of adequate lubrication is the source of much trouble and stated that toolmakers have a long way to go before this problem is satisfactorily solved. N. W. Dorman, Toledo Machine & Tool Co., Toledo, O., challenged this statement and outlined a few of the measures tool designers are taking to remedy lubrication evils. In some instances, he said, entire drives have been redesigned to permit better lubrication. C. B. Lord, Advance Rumely Co., Battle Creek, Mich., emphasized the need for greater simplicity in the design of machine tools.

At the suggestion of the chairman, the discussion was diverted to the subject of painting machinery. Mr. Lord cited an instance where machines operated by girls were painted white, and heavier machines, operated by men, were painted battleship gray. J. A. Smith recommended battleship gray, but expressed the opinion it would be difficult to induce manufacturers or users to agree on a standard color. C. W. Ripsch, Joyce Cridland Co., Dayton, O., explained why gray is a pleasing color to the eyes of machine operators. The discussion on this subject clearly showed a general approval of light gray for machine tools.

Nominate New Officers for A. S. M. E.

For President

Dexter S. Kimball, Cornell university, Ithaca, N. Y.

For Vice Presidents

Col. E. A. Deeds, United States army, McCook field, Dayton, O.

Robert Sibley, *Journal of Electricity*, San Francisco.

Louis E. Strothman, Allis-Chalmers Mfg. Co., Milwaukee.

W. S. Finlay*, American Waterworks association, New York.

For Managers

H. P. Porter, Gypsy Oil Co., Tulsa, Okla.

Horace P. Liversidge, Philadelphia Electric Co., Philadelphia.

Sherwood F. Jeter, Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

For Treasurer

William H. Wiley, John Wiley & Sons, Inc., New York.

*For uncompleted term of D. S. Kimball.

Henry T. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J., presented a paper on the influence of the automobile on gear cutting and gear cutting machinery. This and other papers in the symposium will be published in an early issue of THE IRON TRADE REVIEW. N. W. Dorman presented a paper entitled "The Relation of Power Presses and Dies to the Automobile Industry", which was written by H. T. Hinde, Toledo Machine & Tool Co., Toledo, O. Mr. Dorman exhibited a number of sheet metal stampings to illustrate points brought out in Mr. Hinde's paper. In the discussion, J. A. Smith stated that in a number of instances, the shafts of power presses are not large enough and that breakage results. He suggested that bearings be designed so that they could be removed more easily.

Mr. Good, Jones & Lamson Machine Co., Springfield, Vt., read a paper prepared by Ralph E. Flanders of the same company on the influence of the automobile on lathe practice. In the introduction, Mr. Flanders reviews the influence of the bicycle craze in 1890, the development of high-speed steel by Taylor in 1900 and the automobile at the present time. He characterizes the situation as a contest between the machine and the high-speed cutting tool much like the classic rivalry between the projectile and armor plate.

Following the presentation and discussion of papers in the symposium on the influence of the automobile, Chester B. Lord, Advance-Rumely Co., Battle Creek, Mich., presented a paper on the fundamentals of interchangeable manufacture. His discussion is based upon the axioms that no two things are alike, that the difficulty of maintaining accuracy increases in geometric ratio with each added accurate dimension on the same piece, that no machine or tool under stress can be accurate, that the manufacture of interchangeable parts in quantity is a matter of percentage, and that irrespective of the method used quality is a matter of insistent attention.

Following a discussion on this paper, which drifted back to the subject of standards, a resolution was passed requesting the council of the society to establish a committee on the standardization of machine tools.

Advocates Combining School and Shop Training

THE existing educational system of the United States was thoroughly condemned by several speakers at a session on industrial training held Tuesday evening. Dr. Ira N. Hollis, president Worcester Polytechnic institute, Worcester, Mass. presided. H. E. Miles, National Association of Manufacturers, New York, declared that an investigation of 5054 high schools indicates that only 2000 profess to teach civics and only 136 used accredited texts. The testing of 1,500,000 enlisted men in the war showed that only 10 per cent are college bred and that the other 90 per cent run all the way from high school training to illiteracy. Mr. Miles declared that 24.9 per cent of the population cannot read English or write a letter. The remedy of this situation, according to the speaker, lies in providing the equivalent of high schools and colleges for wage earners. However, these equivalents must be adapted to the needs of the workers.

Describes Co-operative Course

The facts brought out by Mr. Miles served as a timely introduction to the paper on "The Engineering Industries and Engineering Education" by Magnus W. Alexander, managing director, industrial conference board, and Prof. Dugald C. Jackson, Massachusetts Institute of Technology, Boston. In this paper the Schneider co-operative engineer course and that organized by the General Electric Co. in connection with the Massachusetts Institute of Technology are described in detail. These courses, by which the student is trained simultaneously in college and factory, go a long way toward solving the problem of the poor boy who must "work his way through". H. C. Smith, Chicago, explained what the National Metal Trades association is doing and planning to do to promote industrial education.

Discuss Fuel and Stokers

Pulverized coal and stokers absorbed most of the attention of engineers who attended the fuel session Tuesday morning, at which Joseph Harrington, consulting combustion engineer, Chicago, presided. Papers on stokers and stoker practice were presented by E. G. Bailey, Bailey Meter Co., Cleveland; E. H. Tenney, Union Electric Light & Power Co., St. Louis, and John E. Wilson, Chicago. The last named speakers discussed the subject from the standpoint of using mid-west coals.

Considerable discussion centered upon a paper entitled, "Boiler Tests with Pulverized Coal" by Henry Kreisinger, Milwaukee, and John Blizard, Pittsburgh. The paper covers tests made on a boiler fired with pulverized coal at the plant of the Milwaukee Electric Railway & Light Co., Milwaukee. The authors conclude that the best results are obtained when the coal is burned at the rate of 1 to 1½ pounds per cubic foot of combustion space per hour. In reply to a question regarding the safety of pulverized fuel, Mr. Kreisinger declared there is no danger if the coal dust is kept out of the room atmosphere. John A. Stevens, consulting engineer, Lowell, Mass., raised the question of the value of preheating the combustion air, stating that higher efficiencies can be obtained by this practice. Mr. Kreisinger estimated that by raising the temperature 180 degrees by preheating, the efficiency could be increased about 3 per cent.

The important problem of preventing "flashbacks" in welding and cutting with oxyacetylene gas received considerable attention in connection with a paper entitled, "An Investigation of Oxyacetylene Welding and Cutting Blowpipes" by R. S. Johnson, engineer-physicist, United States bureau of standards, Washington, D. C. This paper was published almost in full in the May 19 issue of THE IRON TRADE REVIEW. E. C. Wanamaker, Chicago, Rock Island & Pacific railroad, Chicago, discussed the paper from the standpoint of the user of oxyacetylene apparatus, stating that although great strides have been made in the art of welding and cutting, there still are many problems that have not been solved. Simple cutting and welding of thin material has been mastered so that comparatively unskilled workmen can do the work satisfactorily. In thick sections, however, even skilled operators frequently are baffled by difficulties, and it is in this field, according to the speaker, that more knowledge is needed. Mr. Wanamaker also emphasized the present importance of economy, which next to quality, should be the most essential factor in good welding and cutting practice. Safety and economy were also stressed by other speakers.

Two hundred machinists employed by the Walter Scott Printing Press Co., Plainfield, N. J., have gone on strike, following the announcement of a 10 per cent reduction in the wage scale, to 72 cents an hour.

Obituaries

KARL G. Roebling, president of the John A. Roebling's Sons Co., Trenton, N. J., died suddenly May 29, at Spring Lake, N. J., while playing golf. He was in his forty-eighth year. Death was due to apoplexy believed to have been superinduced by overwork. From the time he assumed the presidency of the Roebling company, he has devoted himself indefatigably to his numerous duties. Mr. Roebling went to his summer home in Spring Lake May 28 and engaged in a game of golf with his cousin, William A. Anderson, superintendent of the Roebling plant.

When he became president of the John A. Roebling's Sons Co., following the death of his uncle, Charles G. Roebling, Oct. 5, 1918, Mr. Roebling virtually assumed the business burdens that had been borne not only by his uncle but also his father, who died March 16. His brother, Ferdinand W. Roebling Jr., is again active in the business after having suffered for a time from impaired health. His uncle, Col. Washington A. Roebling, who only a few days ago celebrated his eighty-fourth birth anniversary, does not take an active part in the company's affairs as in previous years.

Karl G. Roebling was born in Trenton, N. J., July 7, 1873. His education was obtained in the Trenton Model school, in Lawrenceville Preparatory school, and in Princeton university, from which he was graduated with the class of 1894. He then entered the industry established by his grandfather, John A. Roebling. Mr. Roebling's first employment was as a day laborer. He went from one department to another, filling the humblest of positions and remaining in them until he had become thoroughly familiar with all of the various phases of production. Then he became identified with the sales department and at the same time familiarized himself with the work of the office. He remained with the sales department until he became its head. Mr. Roebling remained as head of the sales department until the reorganization following the death of Charles G. Roebling, when he was elected as president of the company.

Mr. Roebling was active in the affairs of other businesses beside that of the Roebling company. He was one of the directors of the Trenton Brass & Machine Co., the Otis Elevator Co., the Standard Fire Insurance Co., the Woven Steel Hose & Rubber Co., the John A. Roebling's Sons Co. of New York and Philadelphia and the Durable Wire Rope Co., Boston. He was one of the directors of the Trenton Chamber of Commerce, a member of the Railroad Club of New York and a member of the American Iron and Steel institute.

Albert G. Bradford, member of the advertising firm of N. W. Ayer & Son,

KARL G. ROEBLING

Philadelphia, died May 16, in that city, aged 61 years.

Edward A. Mulliken, Short Beach, Conn., who during the war organized the Connecticut Aircraft Co., New Haven, Conn., maker of balloons for the army and navy, died in Westfield, Mass., May 14, aged 64 years.

Richard Peters, head of the oldest branch of a famous colonial family, died May 24, at the Woman's College hospital, Philadelphia, where he had been ill for the last two months. Mr. Peters was born 72 years ago in Atlanta, Ga., where his father was an early pioneer and gave the city of Atlanta its present name. Mr. Peters was educated in a private school in England and upon his return to this country became a civil engineer and afterward attended the Rensselear Polytechnic institute. In 1880, he went north to become secretary of the Chester Rolling Mills, Chester, Pa. He later became identified with various enterprises in Chester and organized and served as the first president of the Chester Street Railways Co. One of his sons is Richard Peters Jr., manager of sales of the Pulaski Iron Co., with headquarters in Philadelphia.

Alexis I. du Pont, secretary and a director of E. I. du Pont de Nemours Co., Wilmington, Del., died at Wilmington May 30 following a 10-day illness. He was born in Wilmington in 1869, was graduated from Harvard in 1892 and then joined the du Pont company.

J. Paul Amaden, superintendent of the warehouse of the Carnegie Steel Co., Allston, Mass., died May 26 at his residence in Brookline, Mass. Mr. Amaden was the son of Edward A. Amaden, general superintendent of all the warehouses of the Carnegie Steel Co. He had been in the service of the company since his graduation from college.

Col. Thomas Curtis Clarke, civil and metallurgical engineer, died suddenly, May 25, at the Roosevelt hospital, New York, of pneumonia, following an operation. He was a brother of E. A. S. Clarke, president of the Consolidated Steel Corp., New York. He was born Dec. 11, 1873, at Philadelphia, the son of Thomas C. Clarke, one time president of the American Society of Civil Engineers. Colonel Clarke had engineering charge of special work for the Illinois Steel Co., was formerly general superintendent of the Lackawanna Iron & Steel Co. and was a consulting engineer, specializing in coal and coke and its by-products until the war. He served in the American Expeditionary Forces as colonel of the 110th engineers, 35th division and gained renown by his bravery and handling of his regiment in action. He was awarded the croix de guerre by the French government and both he and his regiment were mentioned for distinguished service. After his regiment was mustered out, Colonel Clarke became vice president of the International Coal Products Co. He was a member of the American Institute of Consulting Engineers, Society of American Military Engineers, American Society of Civil Engineers and Society of Chemical Industry.

Drop Continues in Steel Exports

April Shipments Smallest Since February, 1915—Only Seven Products Show Increases, All Small, While Rails, Structural Steel, Plates and Steel Bars Declined Sharply in Large Tonnages—Imports Gain

APRIL exports of iron and steel declined to the lowest point in any one month since February, 1915. The tonnage, 162,793, is only 16,973 tons more than the February shipments in 1915. Compared with last March, the April figure is 67,460 tons short; as against February, the loss is 231,845 tons; and compared with January, the decline is 383,609 tons.

The falling off in exports in April from the March level was registered in every product listed in the bureau of foreign and domestic commerce tables except iron sheets and plates, steel sheets, fabricated steel, barbed wire, pipes and fittings, horseshoes and cast radiators. In only one of these classifications, pipes and fittings, was the April tonnage more than 2000 tons greater than in the month before.

Pipes and fittings exported in April totaled 40,801 tons as against 38,391 tons in March. Steel sheet shipments, 5799 tons in March, totaled 7193 tons in April. Barbed wire exports in April were 970 tons as compared with 799 in March; iron sheets and plates, 1550 tons compared with 1225; fabricated steel, 1238 tons compared with 209 tons; horseshoes, 73 tons compared with 48; and radiators, 273 tons, as against 146 tons.

Pig iron shipments fell to 1243 tons from 2320 tons in March and ingots, blooms and billets, listed in the accompanying tables as semifinished material, declined from 1023 tons in March to 678 tons in April. The pig iron shipments were the lowest in years while the semifinished exports had gone as low as 92 tons in February.

Declines in sizable tonnages as between April and March, were registered in steel rails, a loss of 17,000 tons; structural steel, 18,000 tons; plates, 15,000 tons; and steel bars, 11,000 tons.

Imports in April continued the upward trend begun in March, the total incoming tonnage of iron and steel aggregating 4935 tons as compared with 4505 tons in March, 3672 tons January. The increase, compared in February and 17,104 tons in with April, was due largely to gains in pig iron receipts, 2781 tons coming in in April as against 829 in March. Scrap and practically all other products, except rails, showed declines.

Iron ore imports increased approximately 30 per cent in April, while incoming shipments of various ores and ferroalloys declined fully 60 per cent. Manganese ore receipts fell to 47,260 tons from 69,710 tons in March. Nickel ore, totaling 50,537 tons in March, aggregated only 265 tons in April.

Swedish ore imports increased from 4183 tons in March to 35,303 tons in April, while Cuban ore imports declined from 22,300 tons to zero.

IMPORTS AND EXPORTS

Gross tons

	1921 Imports	1921 Exports	1920 Imports	1920 Exports
Jan.	17,104	546,402	45,796	333,514
Feb.	3,672	394,638	32,279	308,846
March	4,505	230,253	33,266	449,171
April	4,935	162,793	26,032	395,256
4 mos.	30,216	1,334,086	137,363	1,486,887
May	.....	....	29,125	419,064
June	.....	.....	40,549	392,780
July	.....	.....	32,742	419,230
Aug.	.....	.....	58,335	431,519
Sept.	.....	.....	31,825	408,605
Oct.	.....	.....	39,797	451,972
Nov.	.....	.....	50,995	434,290
Dec.	.....	.....	15,120	499,780
Total.	30,216	1,334,086	412,649	4,956,327

	1919 Imports	1919 Exports	1918 Imports	1918 Exports
Jan.	16,932	370,876	12,475	490,259
Feb.	11,819	340,623	12,940	432,465
March	17,750	367,314	14,312	380,062
April	16,561	402,653	11,247	463,035
4 mos.	63,062	1,481,466	50,974	1,765,821
May	18,136	414,029	14,387	488,515
June	21,761	562,954	13,913	418,178
July	28,258	287,685	11,789	457,118
Aug.	28,990	396,112	12,862	511,782
Sept.	37,492	363,618	9,013	473,116
Oct.	40,698	302,362	15,552	426,458
Nov.	43,855	336,959	11,329	439,268
Dec.	39,797	254,767	28,445	357,753
Total.	322,264	4,397,295	168,264	5,338,019

IRON AND STEEL IMPORTS

Gross Tons

	April 1921	April 1920	Ten months ending April 1921	Ten months ending April 1920
Pig iron	2,781	12,109	45,195	100,933
Scrap	1,284	7,818	80,461	184,105
Bar iron	10	179	3,468	2,641
Ingots, blooms and billets	255	2,717	7,902	24,602
Struct'l shapes	75	136	1,249	958
Rails	298	2,742	28,744	10,569
Sheets and plates	2	192	2,376	1,182
Tin and terne plate	89	30	463	312
Wire rods	141	109	4,577	797
Total	4,935	26,032	174,435	326,099

IMPORTS VARIOUS ORES AND FERROALLOYS

Gross Tons

	April 1921	April 1920	Ten months ending April 1921	Ten months ending April 1920
Ferrom'g'nse	2,115	3,018	42,857	29,298
Ferrosilicon	191	633	6,659	13,820
Mang'n'se ore	47,260	35,088	610,938	186,986
Tung. bearing ore	108	29	1,152	4,990
Nickel ore	265	3,127	17,333	22,365
Total	49,939	41,895	678,939	257,459

IRON ORE IMPORTS

Gross Tons

From	April 1921	April 1920	Ten months ending April 1921	Ten months ending April 1920
Spain	....	8,270	26,496	54,602
Sweden	35,303	8,020	108,426	46,945
Canada	305	977	18,897	6,559
Cuba	....	68,071	525,448	506,554
Other countries	37	3,332	188,219	48,854
Total	35,645	88,670	867,486	663,514

IRON AND STEEL EXPORTS

Gross Tons

	April 1921	April 1920	Ten months ending April 1921	Ten months ending April 1920
Pig iron	1,243	14,575	121,451	215,691
Scrap	2,662	5,299	174,745	37,735
Ingots, blooms & billets	678	19,032	80,694	242,585
Wire rods	1,402	11,865	58,433	87,257
Steel rails	31,392	46,456	506,026	445,743
Steel bars	7,985	48,894	497,950	508,417
Iron bars	312	3,024	38,092	29,683
Struc. iron and steel	19,831	36,935	490,498	272,559
Hoops, bands and scroll	1,043	4,825	36,217	36,121
Galv. sheets and plates	4,173	10,194	87,171	81,369
Iron Sheets and Plates	1,550	1,568	23,188	27,797
Steel plates	29,006	76,248	734,721	590,849
Steel sheets	7,193	13,606	137,858	119,534
Ship and tank plates, punched & shaped	1,238	6,068	29,719	23,195
Tin and terne plate	3,406	23,057	173,981	166,342
Barbed wire	970	14,034	84,153	100,270
All oth. wire	3,580	17,605	162,369	131,897
Cut nails	12	147	3,406	1,251
Wire nails	767	6,446	72,051	53,962
All oth. nails incl. tacks	255	622	9,276	7,445
Pipes & fit'gs.	40,801	28,551	441,442	219,022
R.R. sp'kes	901	1,748	13,231	14,190
Bolts, nuts, rivets	2,047	3,939	35,152	28,143
Horseshoes	73	36	1,461	1,936
Cast radiators	273	482	4,491	5,943
Total	162,793	395,256	4,017,776	3,448,936

EXPORTS PIG IRON AND SEMIFINISHED

Gross tons

	1921 Pig iron	1921 Semi-finished material	1920 Pig iron	1920 Semi-finished material
Jan.	3,926	315	18,468	19,937
Feb.	1,307	92	15,573	22,693
March	2,320	1,023	21,638	30,444
April	1,243	678	14,575	19,032
4 mos.	8,796	2,108	70,174	92,106
May	.....	.....	13,032	16,370
June	.....	.....	17,105	29,811
July	.....	.....	29,647	17,243
Aug.	.....	.....	22,645	20,920
Sept.	.....	.....	22,724	18,113
Oct.	.....	.....	17,267	11,853
Nov.	.....	.....	13,929	7,042
Dec.	.....	.....	10,055	3,415
Total.	8,796	2,108	215,502	216,873

	1919 Pig iron	1919 Semi-finished material	1918 Pig iron	1918 Semi-finished material
Jan.	36,757	11,594	20,581	195,385
Feb.	20,925	9,900	10,711	166,807
March	22,158	8,176	9,849	144,443
April	17,038	11,488	11,282	177,128
4 mos.	106,878	41,158	52,423	683,763
May	37,087	20,771	22,567	159,299
June	39,785	46,016	22,896	139,377
July	42,327	21,318	20,265	139,612
Aug.	36,071	36,162	26,028	189,851
Sept.	18,991	37,513	34,494	135,450
Oct.	14,108	20,713	35,452	125,023
Nov.	21,429	13,211	30,825	149,924
Dec.	14,612	21,538	24,625	63,890
Total.	321,261	258,400	269,575	1,786,189

Few Tools Were Bought in May

Equipment Sales Were Small as Metalworking Operations Remain at 40 Per Cent—Railroad Inquiries Indicate Purchases Soon — Machine Tool Prices Hold but Small Tool Quotations Are Weak

WITH operations in metalworking plants in many cases scarcely exceeding 40 per cent of capacity, sales of machine tools and equipment during May were few and far between. Despite this, however, the consensus of opinion of both manufacturers and tool dealers is that the month's business has been no worse than that of the preceding month, and some go so far as to state they noted a little improvement. Machine tool manufacturers in general report their shops in May were operating at approximately 20 per cent of capacity, and here and there some report their operations were as high as 35 and 40 per cent, the latter being extremely rare.

Single Tool Sales the Rule

SALES during the month generally were confined to single tools but occasionally an order for two and three machines was placed. What perhaps has been the surprising development of the market, has been the little interest shown in machine tools by the automobile manufacturing companies, which a month back were reported as increasing their operating schedules, and to which tool dealers and manufacturers looked to furnish a demand for their products. Contrary to this expectation, however, purchases of machine tools by the automotive trade have been exceptionally few and indications at present are that no purchasing of size will be done by this trade until next year.

Used Machinery Sells at Low Prices

USED machinery at present is the biggest obstacle in path of manufacturers and new tool dealers. There is a large quantity of this equipment on the market and more is being placed daily. Practically all is in exceptionally good condition and some even verges on being practically new. This equipment is offered at extremely low prices and consequently sales of new equipment are and will be held up until this class of equipment is liquidated. As an example of the low prices possible to be obtained, and which shows the general apathy of tool users toward purchasing, the results of the auction of the machinery and equipment of the Highland Machine Co., Boston, are interesting. This auction was well attended but little bidding was developed. In some cases bids were started as low as $50 and machines which generally cost from $1800 to $2000, went at prices ranging from $400 to a little over $700, the price of $725 being the highest made, which was on a 24 x 24-inch iron planer.

Inquiries Are on the Increase

ALTHOUGH May sales were disappointing from the standpoint of volume there seems to be a better feeling in the market generally. This is due to the constantly growing number of inquiries becoming current, many of which are believed to indicate a real buying movement soon. The principal cause of the hopeful attitude of tool sellers, one manufacturer states, is due to the number of fairly sizable inquiries which are current from the railroads. Many of these involve as high as a dozen tools and although the financial tangles of the railroads have yet to be ironed out, many of the inquiries current are believed to indicate a buying movement on the part of the carriers before the end of summer. One instance is known where the purchasing agent of a railroad inquired for a large number of tools and at the bottom of each inquiry he stated: "We have decided to purchase these tools and want to close on them immediately." This would seem to indicate the inquiries were genuine and not merely market feelers, which have been the run for some time past. Fairly sizable inquiries to become current in May included those from the Montana Tractor Co., Oconto, Wis., which wanted tool room equipment, including engine lathes, arbor presses, etc.; the Durabilt Steel Locker Co., Aurora, Ill., which inquired for a lot of miscellaneous equipment and the Big Four railroad, which wanted approximately $80,000 of tools, including lathes, drilling machines and boring mills.

Export Market Was Inactive

THE export market has been somewhat inactive due to the unbalanced condition of exchange. Nevertheless a number of large export inquiries were being considered, although in most cases, tool manufacturers do not look for any large business from this source until exchange conditions have improved. During the month the A. R. Brown-Macfarlene Co., New York, issued an inquiry for 15 tools for export to Japan; an inquiry also was placed current for $1,000,000 of locomotive shop equipment for a company in Sweden.

Tool Prices Are Firm

PRICES continue to hold at the levels established some time ago. This refers to machine tools in general, but on special machines it is understood some reductions have been made. An example of this has been the reduction of 10 per cent made by a Philadelphia maker of slotting machines and a similar reduction by a New England manufacturer of sheet metalworking equipment. Aside from these no reductions have been noted, but it is understood that here and there shading has been done by dealers, whenever such action was necessary to close a sale. This shading is said to have been as high as $200 on the quoted prices and in many instances involved almost the entire commission of the dealer. General equipment prices are extremely weak. During the month small tool prices were reduced. Cap and set screw makers lowered their quotations 10 per cent and manufacturers of machine screw, nut and stove bolt taps, also revised their prices, as did some makers of wrenches, jacks, taper pins, pipe vises, etc.

Small Tool Demand Was Fair

DEMAND for small tools during the month was reported as being fair, but a surprising development has been the lack of demand for repair parts. One large midwestern manufacturer of machine tools reports that it had expected the demand for repair parts would be large enough to keep its plant running at almost 50 per cent of capacity, but contrary to expectations, there is scarcely any demand for this class of product.

Crane Market Was Dull

AS IN the machine tool market, demand for cranes and similar shop equipment was extremely low. New inquiries came out rather slowly and those which have been current for some time past are still held in abeyance. A few purchases were made but they seldom involved more than a single unit.

Equipment Market Is Stagnant

Demand for Tools Continues Small—Week's Trading Is Featured by Railroad Purchases and Inquiries—Special Machinery Prices Are Weak—Sellers Are Confident of a Revival in Buying of Machinery

MACHINERY and equipment demand still is small, sales in the week just past, with a few exceptions, being confined to single units, representing absolute requirements of users. An outstanding feature of the week's trading was the purchase of equipment by a number of railroads and the issuance of inquiries by several others. These latter have caused a perceptible feeling of optimism to be felt throughout the market.

Tool users in general continue to show little interest in machinery offerings. Even secondhand dealers are experiencing more difficulty now in disposing of their stocks than they have at any time since the industrial depression set in. This is due to the slackening of the metalworking industry, which now is estimated to be operating at but little more than 40 per cent of capacity in some districts. Machine tool building shops on the average are operating on schedules ranging from 20 to 35 and 40 per cent. The 20 per cent average is general while the latter figures are exceptional. Some shops are altogether down.

Demand for small tools is reported fair but there is scarcely any demand for repair parts. This is surprising in view of the fact this class of product was expected to be in large demand. Evidently little repairing is being done though now is the logical time for such work.

Prices are reported as firm on general machine tools, but are weak on special machinery and small tools. In the past week several special machinery makers were noted as reducing prices. Quotations on small tools and equipment were revised some time ago, but are understood to be still weak, demand being small from the trade in general.

Export demand is quiet although there are a number of sizable foreign inquiries current which may develop into some large trading. Until exchange conditions are bettered tool manufacturers and dealers feel the export field will not prove productive of much business. Perhaps the most outstanding feature of the week has been the purchase of nine tools by the Virginian railroad, which recently issued a large list. Other railroads were purchasers and still others, including the Great Northern, issued inquiries. It is felt that although many of these inquiries have been issued before they now represent business as it is understood that railroad mechanical departments are pressing for the purchase of needed equipment.

Railroad Buying Features Eastern Tool Market

NEW YORK, May 31.—After reducing its list, the Virginian railroad closed recently on nine machines. One dealer was awarded four lathes and one radial drill; another a wheel lathe, and another a boring mill and several other machines. An eastern seller received an order for a 36-inch lathe and a radial drill from the Chicago, Rock Island & Pacific railroad. A couple of screw machines and a combination punch and shear are also to be purchased. The Delaware, Lackawanna & Western railroad is inquiring for prices on a small list of equipment including three engine lathes. The machines are for installation in various repair shops. A list of tools is also to be issued for the Delaware shops at Forty Fort, Pa., it is understood.

The largest order to be placed in the East of late is that of the American Locomotive Co., 30 Church street, involving six special boring mills. It is said the equipment cost approximately $70,000. Generally, however, orders of any description are scarce. Many sellers in this district predict that May will have been the dullest month for them in almost a year. Further, there appears to be little prospective business for the relatively near future, in the domestic market. This also applies in a general way to the foreign market, although two or three sizable inquiries may develop into business shortly.

An inquiry before the electric overhead crane market is that of the Greeneville Steel Car Co., Greeneville, Pa., involving a 10-ton crane, with 70-foot span. Included in orders is a 2-ton electric overhead crane, with 25-foot span for the Chapman Valve Co., Indian Orchard, Mass., placed with the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. A 5-ton electric crane was placed with another builder. The American Shipbuilding Co., Cleveland, has sold a 20-ton Champion crane, with 59-foot span. Ira S. Bushey & Son, recently reported as being in the market for an overhead crane for their shipyard at the foot of Court street, Brooklyn, purchased instead two 6-ton hoists, with 30-foot lift, from the Chisholm-Moore Mfg. Co., Cleveland. The Barber Asphalt Co., Maurer, N. J., has purchased a 5-ton, I-motor crane, with 39-foot span, from the New Jersey Foundry & Machine Co., 90 West street. James T. Kelly's Sons Co., 251 Greene street, Brooklyn, is inquiring for a 10-ton handpower crane, with 50-foot span. The Richard de Cou Co., Philadelphia, is inquiring for a locomotive crane.

Small Plants Are Buyers

BOSTON, May 31.—While each week shows a few scattered sales of new machines in New England, the market genally is stagnant. Used equipment has almost entirely usurped the new tool field and more and more of this class of tool seems to come on the market. Manufacturers and dealers continue to liquidate part of their equipment through financial necessity. It is reported that during the next week or

Convenient, Accessible Yard Storage Demands Up-to-date Crane Equipment

There are very few shops too small to find good use for a modern yard crane such as this. It will handle your raw materials—bars, billets, steel plates, scrap, sand, coke, coal, etc.—with speed, with safety and with greater convenience than any other way of moving. It provides a vital, necessary, link between the yard and shop.

NILES ELECTRIC TRAVELING CRANES

Not only will a Niles Crane do the work of a dozen men, but it permits materials to be stored with greater compactness. It eliminates the need of wide alley-ways and will load or unload materials at any point without disturbing other stuff piled around it.

The strength and reliability of Niles Cranes is assured by the rugged, sturdy construction of the lifting gear and electrical equipment. Both these have been designed with special reference to do the work expected of them.

Accessible bearings are easily oiled. Thorough lubrication reduces wear to a minimum. Cables that are prevented from twisting have long life. These factors spell low maintenance.

Niles Cranes are built in all standard sizes up to 250-tons capacity. There is a right style and size for you, no matter what your needs are. 284

NILES-BEMENT-POND CO.

111 BROADWAY NEW YORK

10 days another large auction sale will be held in Boston. Buyers are limited to the relatively small machine tool users who were fortunate enough not to buy at the higher prices of a year ago.

During the week a Cambridge, Mass., user bought an automatic screw machine, an automatic tapping machine, a drill press and other equipment, bringing the total above $3000. A nearby rock quarry bought several tools totaling approximately $2000. A pipe company bought a $1000 motor-driven threading machine. A Rhode Island user bought a lathe, a drill press and a milling machine. Other individual sales reported reached approximately 10 tools. Inquiry is quieter than a week ago. One of the largest dealers reports his daily number of inquiries has dropped 50 per cent. Open inquiry practically doesn't exist. A street railway company is reported as in the market for several tools, but no formal list has been issued. A company which is contemplating the manufacture of iceless refrigerators has a long list of miscellaneous equipment, but the business is contingent upon perfection of manufacturing plans. A western Massachusetts manufacturer wants a lathe, a planer and a milling machine.

Prices continue practically without change, although two or three mid-western manufacturers have announced reduction in special tools. One of these is the Racine Tool & Machine Co., Racine, Wis., with a 20 per cent reduction on high-speed hacksaw machines. Two Massachusetts manufacturers are each asking for a small traveling crane.

Contractors' equipment and road building equipment continues to move more freely than machine tools. A small boiler manufacturer catering to industrial power plants reports an increase in orders during the week.

Tool Demand Is Unimproved

CLEVELAND, May 31.—No noticeable improvement in sales has been noted in the machine tool and equipment trade in the past week. Both dealers and manufacturers in this district continue to report orders are for single machines and these are of a spasmodic nature. The automobile industry is furnishing but little demand. This is somewhat of a surprise to dealers as a fair demand was expected to spring up in this trade.

A number of manufacturers here report there is some demand for small tools but very little for repair parts. This also is surprising as in a time of depression repairing of equipment generally is done. Machine shops and metal-working plants in this section are estimated to be working from 40 to 50 per cent of capacity. Some are doing better than this, but these are rare. Machine tool building shops are down to 20 per cent of capacity, but here and there some report they are operating at 25, 30 and 35 per cent.

Prospects for the future are not exceptionally bright, but despite this there is a noticeable feeling of hopefulness in the market. This, no doubt, is due to the ever increasing number of inquiries being placed, and which although principally for single machines, are thought to be genuine inquiries indicating buying in the near future. An outstanding feature of these inquiries is the number being received from the railroads. Manufacturers state these are becoming more plentiful and now have the appearance of authenticity, not being merely market feelers. One railroad inquiry being worked on here is that of the Great Northern railroad, St. Paul, F. A. Bushnell, purchasing agent, which has inquired for a molding machine, a gyratory foundry riddle, a 42-inch belt-driven heavy-duty sliding head upright drill press, friction back geared; a 24-inch belt driven, sliding head drill with back gear, geared feed and automatic stop; a 48-inch end punch and shear, arranged for motor drive; a belt driven floor dry grinder with ball bearings and countershaft, including two 16 x 2-inch emery wheels and two steel hinged wheel guards; and a belt driven journal box boring machine, double spindle to bore car brasses up to end including 6 x 12-inch, with countershaft. Other inquiries being worked on in this district include one from the Fishel & Marks Co., Cleveland, for shearing equipment; one from the Columbus Forge & Iron Co., Columbus, O., for drop hammers and presses; and one from the Arctic Ice Machine Co., Canton, O., for lathes.

Buyers during the week included the Lake Erie Metal Products Co., Cleveland, which took a single machine. A Cleveland dealer also disposed of several used lathes and expected to close on orders for a number of others within a few days. The Cincinnati Bertolette Machine Tool Co., Cincinnati, O., disposed of a 20 x 10, double back geared lathe for $500 and a 24-inch slide head drill press for $100. Demand for used equipment far surpasses that for new and secondhand tool dealers are able to place machinery on the market which is in exceptionally good condition, at extremely low prices.

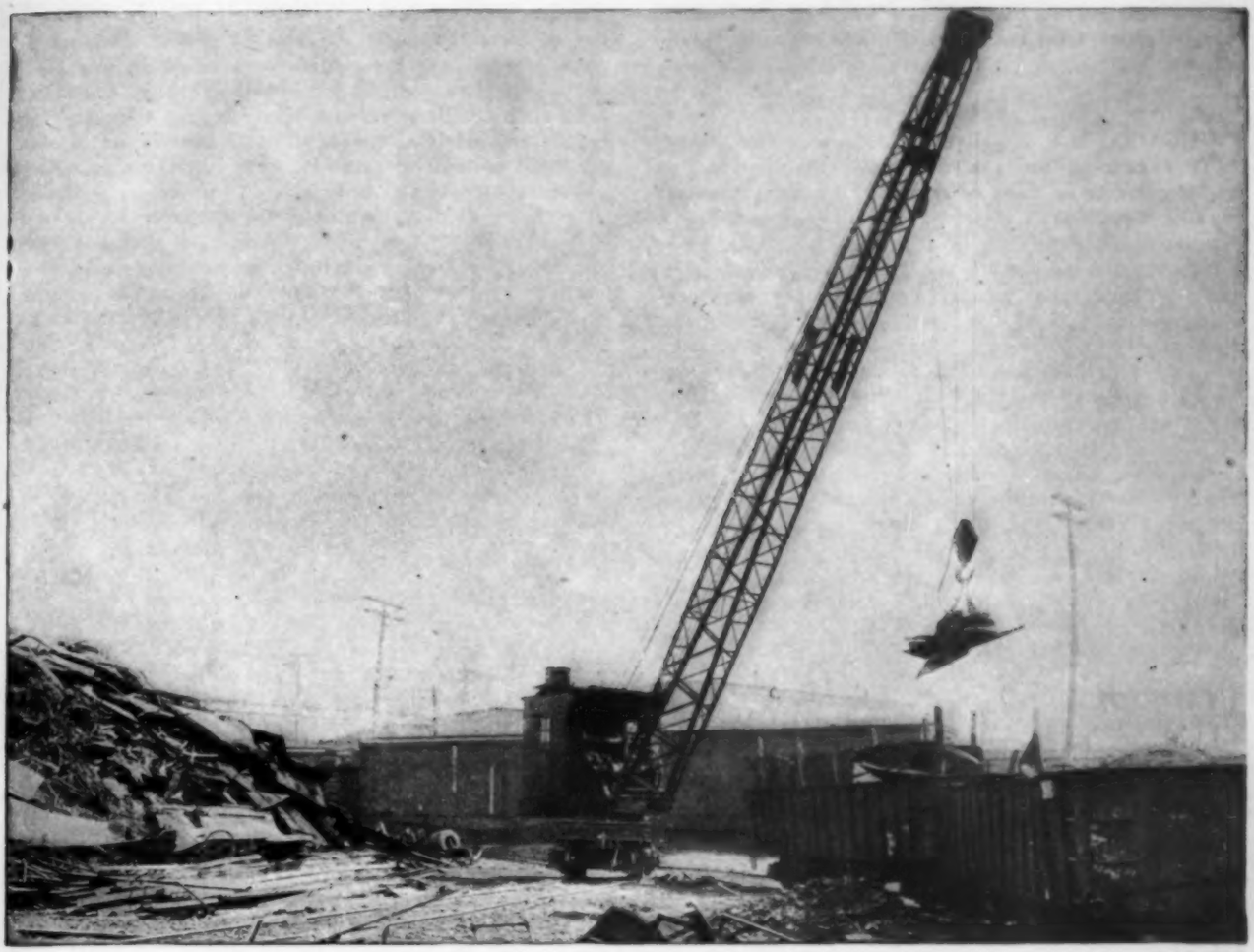
New tool prices are holding at the level established some time ago, although manufacturers state that now and then they hear of shading. New tool orders received by manufacturers are usually wanted for immediate delivery, there being little future requirements being worked on. There is little export business, and although there are a number of export inquiries current, some of which are for large amounts of equipment, manufacturers state they do not expect to do any large business in the export field, until exchange conditions have been remedied.

Building operations in this district are practically at a standstill due to the building strike. At present there seems to be little hope of settling the differences peacefully, and building contractors are threatening to institute open shop operating conditions. There is of course little industrial construction and very little in prospect. Plant expansion is at a minimum and consequently tool requirements are small.

Sales Are in Small Volume

PITTSBURGH, May 31.—Sales of machine tools in this district last week were small. A canvass of the trade revealed few sales, included in which was a drill, an 18-inch motor driven lathe and a number of 14-inch drills. One dealer reports the sale of a mechanically operated motor-driven paper baling machine to Frank & Seder, Pittsburgh. An inquiry for a 2500-ton forging press was put out recently and so far as can be ascertained still is pending. Another inquiry put out was for two pipe threading machines. The buyer, however, has put off his intended purchase for the time being. Generally, however, the machinery market is exceedingly slack, the only going business being for small purpose tools. A prospective purchaser of lathes and other equipment is the Power Gasolene Co., Scottdale, Pa., recently formed to manufacture mechanical equipment. Automatic screw machines, etc. may soon be purchased by the Standard Repair Co., Somerset, Pa. J. V. Hughes & Co., Johnstown, Pa., soon will enter the market for presses and other machinery.

The same quiet condition prevails in the crane market. Little business is going and where a new job comes up for consideration it is not likely that any business can be done unless the cranemaker offers an attractive price. As an illustration, one maker in order to meet a competitor's price was compelled to lower his bid $1600. While all contracts for crane equipment for the South high school, Youngstown, O., were closed last Wednesday, nothing has been heard of any placings of the coal handling equip-



"Our Crane does the work of 25 men"

The cost of handling material is an important item in the wholesale scrap iron business, says Mr. S. J. Bialosky, President of Bialosky Bros., Cleveland, Ohio. Hand handling is too slow and expensive. In fact, we shouldn't be in the business at all if we didn't have a dependable Brownhoist locomotive crane to handle the tonnage necessary to make us a satisfactory profit.

Our Brownhoist has been in service for seven years, he continues, and is working as well today as it did the day we bought it. On the average we are handling over 200 tons of scrap per day and figure that the Brownhoist is doing the work of 25 men in our yard. Besides loading and unloading material, this crane is also used for switching cars around the yard.

Some very interesting data has been received from this company, comparing the costs of hand handling with those of their Brownhoist locomotive crane. Perhaps this comparison would be of value to you in checking up your handling costs. We shall be glad to send you a copy of this report on request.

The Brown Hoisting Machinery Co. Cleveland, Ohio.

Branch Offices in New York, Pittsburgh, Chicago, San Francisco and New Orleans

BROWNHOIST

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ment. The only active business before makers at the moment comes from the Sharpsville Boiler Works, Sharpsville Pa., calling for a 12-ton bull riveter.

Railroads Are Expected to Buy

CHICAGO, May 31.—Except for prospective business from railroad shops after June 1 the machine tool market presents no signs of revival of buying. Announcement of lower wage scales on the roads is expected to release some business from that source. Nothing definite has come from purchasing agents but mechanical departments are said to be pressing for purchase of their more active needs. Efforts to revive buying among general users results in admissions of needs but a determination to postpone purchasing to a future date. Many shops have an excess of tools for which no present need exists and offers to trade for other types are made.

Prices remain unchanged, tool builders seeing no increase in business as a result of further cuts at this time. New enterprises are not being undertaken in anything like usual volume and this further reduces demand for tools. Some selling of occasional single tools makes up the present run of business, much of which is of the lighter type of equipment, used in garages and small machine shops.

Situation Shows Little Change

MILWAUKEE, May 31.—Conditions in the local machine tool trade show little change. What difference can be detected is favorable, which forms an encouraging feature of the situation. Here and there an inquiry appears for a small list of miscellaneous equipment, but generally orders are limited to single tools which are wanted for immediate delivery. Future business is entirely absent and the operation of machine tool manufacturing plants increases or declines in a very close relation to the quantity of current business. Makers of milling machines are more hopeful over the outlook because of an increase in business in the last week or two, although calls have been almost entirely for one machine at a time, and customers are widely scattered. Local industries are in about the same position as those in other metalworking centers, few purchases being made since the average production of machine shops is figured to be not over 40 per cent. Milwaukee is a typical market because of the wide diversity of its metalworking industry as well as its general industries, so that local conditions usually reflect with unusual fidelity the situation generally throughout the country.

Canadian Demand Continues to Improve

TORONTO, Ont., May 31.—The improvement in the Canadian demand for machinery and machine tools continues to hold. Dealers say they have had a favorable week. Users of equipment now are coming forward with orders and while the major part of these are for single tools they are putting a brighter aspect on trade generally. Woodworking machinery and equipment for the mining fields are moving in a good way, and while iron working lines are backward, they are also in fair demand. Demand for small tools has improved during the past week and lists for these are of larger volume. The makers of automobiles and parts are doing a fair amount of tool buying and as this industry is at the height of its season's activities, it is expected that orders from this source will be maintained for sufficient time to hold up business until other industries enter the market. Inquiries for various lines of equipment continue to appear, and while dealers say there are no big lists out, there is some acceptable business offering.

Construction and Enterprise

Concise and Timely Business Building Opportunities from the Field of Industry

Along Middle Atlantic Seaboard

ALBANY, N. Y.—The Hires-Turner Co., Philadelphia, will erect a plant here, 1-story, 150 x 300 feet, to cost about $250,000.

BINGHAMTON, N. Y.—The Achilles Rubber Co. plans a power house, 1-story, 76 x 76 feet, to cost about $20,000.

BROOKLYN, N. Y.—The Pompeian Bronze Co., recently organized, has leased a plant at 603-11 Dean street.

BROOKLYN, N. Y.—The Minerva Electric Co. has been incorporated with $5000 capital, by J. Gelber, S. Lozer, S. Kendler and A. Gelber, 543 Van Siclen avenue.

BROOKLYN, N. Y.—The Shults Bread Co., 32 Court street, is reported planning a 1-story automobile service and repair works, to cost about $75,000.

BROOKLYN, N. Y.—The Bedford Auto Rim Co. has been incorporated with $100,000 capital, by C. Z. and F. Weiner and I. S. Natkin, 51 Chambers street.

BROOKLYN, N. Y.—J. Sichler & Co., Inc., has been incorporated with $50,000 capital stock, by F. E. Breyfogle, A. J. Swenson and C. K. Bohl, to operate a machine and repair works. P. F. M. Ruther, 55 Wall street, represents the company.

BUFFALO—Batt, Inc., plumbing, steamfitting, etc., has been incorporated with $150,000 capital by R. Batt and others.

CLARENCE, N. Y.—The Buffalo Truck & Tractor Corp. plans a factory building, 1-story, 60 x 400 feet.

COLONIE, N. Y.—The Troy Tool & Casting Co. has been incorporated with $50,000 capital stock, by A. and F. J. Boerder, P. B. Bird and others.

NEW YORK—The Brooklyn Edison Co., 360 Pearl street, contemplates a power plant to cost about $75,000.

NEW YORK—The capital stock of the New York Band Instrument Co. has been increased from $100,000 to $150,000.

NEW YORK—The Burley Welding Works plans a factory building 3-stories, 40 x 100 feet, to cost about $50,000.

NEW YORK—The Edison Fixture Co. has increased its capital stock from $2000 to $100,000.

NEW YORK—The Fitzroy Chemical Corp. has been incorporated with $25,000 capital, by M. Fitsgerald, E. L. Mullaney and F. Persh, 51 Chambers street.

NEW YORK—The Mosher Machine Corp. has been incorporated with $25,000 capital by R. F. Dugan, G. F. McCoy and G. H. D. Foster, 47 Cedar street.

NEW YORK—The Carnonized Fibre Products Corp. has been incorporated with $100,000 capital, by W. R. Respess, J. A. Boegman and L. F. Strumpf, 233 Broadway.

NEW YORK—The P. C. A. Steel-Fiber

THE COMPLETE PLANT OF STANDARD SCREW PRODUCTS CO.

Manufacturers of

STANDARD CAP and SET SCREWS

SPECIAL SCREW MACHINE PRODUCTS

from the smallest diameter practicable up to 4¼ inches.

COLD UPSET PRODUCTS

HARDENED and GROUND PRECISION WORK

We solicit your inquiries

STANDARD SCREW PRODUCTS COMPANY

Detroit Michigan

Horse Shoe Co. has been organized by G. H. Baker and N. Jaffe to manufacture horseshoes, etc. The company can be addressed at 362 Fifth avenue.

NEW YORK—The Algrotype Corp. has been incorporated with $100,000 capital stock by M. Stewart, A. Gross and J. G. Myerson, 342 Madison avenue, to manufacture typecasting machines and parts.

NEW YORK—The Rosdan Ornament & Novelty Co. has been incorporated with $10,000 capital, by C. Danciger, B. Rosenblum, L. Jackson and V. B. Shepard, 154 Nassau street.

ONEIDA, N. Y.—The W. H. Hess Electric Co. has been incorporated with $15,000 capital to manufacture electrical machinery, by W. H. Hess, M. M. Dunn and M. E. Haigh.

OSWEGO, N. Y.—The capital stock of the Oswego Tool Co. has been increased from $25,000 to $405,000.

ROCHESTER, N. Y.—The Germanow-Simon Machine Co. has been incorporated with $25,000 capital stock, by H. and M. Germanow, J. Simon and J. Goldstein.

SCHENECTADY, N. Y.—The General Electric Co. has increased its capital from $175,000,000 to $185,000,000.

SYRACUSE, N. Y.—The Thatcher Process Co. recently organized with $200,000 capital stock, has completed its plant.

SYRACUSE, N. Y.—The Syracuse Radiator Co. has been incorporated with $100,000 capital, by W. S. Reynolds, J. W. Jones and W. L. Collins.

SYRACUSE, N. Y.—The Sage Radiator Co., Inc., has been incorporated to manufacture cooling and heating apparatus, with $135,000 capital by W. Schneible, North Madison street, Rome, N. Y., and others.

WATERTOWN, N. Y.—The Streif Corp. has been incorporated with $60,000 capital stock, by G. F. and F. Streif and R. L. Maloney, to manufacture washing devices and equipment.

ERIE, PA.—The Caloric Furnace of Erie, Inc., has been incorporated with $30,000 capital, by B. T. Garlick, J. E. Abel, J. E. Walker, Smethport, Pa., and others.

HANOVER, PA.—The Peerless Equipment Co. has been incorporated with $100,000 capital to manufacture machinery, etc., by William D. Himes, Andrew R. Taylor and Walter F. Gemmill.

LEBANON, PA.—The Lebanon Gray Iron Castings Co. has been incorporated with $30,000 capital stock, by Julius H. Caplan and John Hunsicker Jr., to manufacture iron and other metal castings.

McKEEESPORT, PA.—The Sheet & Tin Plate Doubling Machine Co. has been organized by W. E. Davis and Burnett Jarvis, to manufacture an automatic sheet and tin plate doubling machine.

PHILADELPHIA—The Smith & Furbush Machine Co. is having plans prepared for a manufacturing building addition.

PHILADELPHIA—A contract has been awarded to the Kober Construction Co. for a $50,000 municipal power house.

PHILADELPHIA—A $10,000 molding shop addition will be erected by the Southwark Foundry & Machine Co.

PHILADELPHIA—Contract for a $100,000 garage for the Imperial Garage Co. has been awarded by J. M. Hendricks.

PHILADELPHIA—The General Smelting Co. is having plans prepared by Emil G. Perrott, for a factory building.

PHILADELPHIA—Contract has been awarded by Morris Crown for a $11,000 auto repair shop addition.

PHILADELPHIA—The General Smelting Co. is having plans prepared for a factory building.

PHILADELPHIA—The Smith & Furbush Machine Co. is receiving bids on a factory addition. C. E. Schermerhorn is architect in charge.

PHILADELPHIA—The Richard de Cou Co. contemplates the establishment of a 30-acre scrap yard on the Schuylkill river, opposite the Atlantic Refining Co. Work shops will be established.

PITTSBURGH—The Monongahela Casting Co. has plans for the erection of a 1-story plant building at 505 Preble avenue.

PITTSBURGH—The Obendorf Mfg. Co., 7509 Thomas boulevard, steam fittings, supplies, etc., has acquired a site for its proposed plant additions.

READING, PA.—The Union Bronze Co. has been incorporated with $50,000 capital to manufacture cast metal articles, by Robert P. Fritch, Peter A. Fritch and A. K. Fritch.

READING, PA.—The Reading Bottle Crown Co. has been incorporated with $10,000 capital to manufacture bottle crowns, etc., by Samuel Furman, Allen C. Mellert and L. Brooks.

SHARON, PA.—The Petroleum Iron Works Co. has increased its capital stock from $10,000 to $300,000.

UNIONTOWN, PA.—The Eureka Coal & Coke Co. has been incorporated with $200,000 capital, by Sigmond Semsey, Harry N. Mitchell, W. H. Farnsworth and J. W. Nicols.

CAMDEN, N. J.—The Pan-American Recording Co. has been incorporated with $25,000 capital stock, by Ralph L. Freeman, Charles K. Haddon and B. G. Royal, to manufacture recording instruments, etc. French & Richards, 106 Market street, represent the company.

EAST ORANGE, N. J.—The Directo Signal Co. has been incorporated with $125,000 capital stock, by M. E. and G. M. Tucker and Louis M. Sanders, 38 Walnut street, to manufacture automobile signals, etc.

HOBOKEN, N. J.—The Guardian Oil Burner Co. has been incorporated with $1,000,000 capital stock, by Charles L. Von-Dreele and I. H. Brand, 51 Newark street, to manufacture oil burners and oil burning equipment.

IRVINGTON, N. J.—The nickel plating department and other parts of the plant of the M. Weiss & Co., 1144 Springfield avenue, recently were damaged by fire. The loss was estimated at $35,000.

NEWARK, N. J.—Joseph Hollander, Inc., Paris street, plans a storage building, 30 x 45 feet.

NEWARK, N. J.—The H. & H. Foundry Co., Tiffany boulevard, plans a foundry, 30 x 45 feet.

NEWARK, N. J.—Jules Church, 126 South Orange street, will build a 2-story factory building, 44 x 72 feet, to cost about $32,000.

NEWARK, N. J.—The Lauder & Shean Device Mfg. Co. has been incorporated with $500,000 capital stock, by F. E. Lauder, P. A. Shean and Otto Schunck.

NEWARK, N. J.—A $20,000 factory building will be erected by the Cook Electric Co. The structure will be 1-story, 40 x 75 feet, and will be devoted to the manufacture of motors.

TRENTON, N. J.—The Public Service Gas Co. plans a battery of coke ovens at its Camden, N. J., plant.

WILMINGTON, DEL.—The Electric Hose & Rubber Co., Twelfth street, plans the erection of a 1-story plant addition, 75 x 90 feet.

FALLS CHURCH, VA.—The Metals Repair & Supply Co. has been incorporated with $200,000 capital stock, by Charles R. Allen and Edward T. Fenwick, and others, to manufacture metal products, etc.

Central States Activity

EAGLE RIVER, WIS.—F. J. Thrun, Thrun Machine Works, plans a shop building to replace the one recently damaged by fire.

DETROIT—This city plans to erect a power plant for the new municipal electric railroad.

MUSKEGON, MICH.—The Rupright Engineering Co. has been organized to manufacture gasoline motors, etc., by James A. Hoover, Holland, Mich., Frederick Rupright, Grand Haven, Mich., and others.

UNION CITY, MICH.—This city plans the erection of a municipal hydroelectric power plant.

CHICAGO—The Advance Forging & Tool Co. has had plans drawn for a plant building.

CHICAGO—The Crane Co. plans a boiler house addition.

CHICAGO—Whitney & Ford, 4325 Cottage Grove avenue, plans the erection of a machine shop.

CHICAGO—The Superior Store Fixture Co. is having plans drawn for a plant building addition, 1-story, 100 x 113 feet.

CHICAGO—The Ferro Mfg. Co., 2011 South Michigan avenue, automobile specialties, plans a plant at Belvidere, Ill.

CHICAGO—The Harter Mfg. Co., electric light specialties, 525 South Clinton street, has awarded a contract for a 2-story plant building, 100 x 125 feet, to cost about $50,000.

CHICAGO—The Greenway Tool Co., 5123 Kenmore avenue, has been incorporated with $20,000 capital to manufacture and deal in mechanical specialties, etc., by Irvin Green, William R. Green and J. R. Stearns.

CHICAGO—The Chicago Tube & Iron Co., 1469 South Jefferson street, has purchased a block on West Forty-eighth street, 237 x 375 feet, which is improved with a 1-story building.

CHICAGO—The Marvel Equipment Co., 65 East Garfield boulevard, has been incorporated to manufacture and deal in tools, with $25,000 capital, by J. B. Hofheimer, Mark D. Goodman and Henry J. Heart.

KNOXVILLE, ILL.—The Barrett Tank Heater Co. has been incorporated with $100,000 capital stock, by M. A. Barrett, H. A. Barrett and G. F. Hebard, to manufacture heaters and heating apparatus.

ROCKFORD, ILL.—The Petroleum Motors Corp. plans three factory units.

CLAYPOOL, IND.—The Claypool Machine Co. has been incorporated with $70,000 capital stock, by D. W. and J. D. Cripe and W. E. Black to manufacture machinery and tools.

EVANSVILLE, IND.—The Sunbeam Elec-

(*Continued on page* 1554)

WEATHER: Cloudy
The Providence Journal
TWO SECTIONS
IRON AND STEEL MARKET SHOWS PRICE UNIFORMITY
Official Pronouncement Against Advances Clarifies Situation.
"For the first time in practically 12 months the iron and steel market presents something approaching a condition of price uniformity" according to the December number of The Iron Trade Review. "The official pronouncement against any advances by the Steel Corporation, a week ago, as expected, has done more to clear up the ambiguous price situation long existing than any single development in many months."
It is pointed out in the review that with the initial announcement by the Jones & Laughlin Steel Company, Nov. 28, was inaugurated a rapid retrograde movement among independent producers back to the schedule approved March 21, 1919, by the industrial board which, except in wire products and one ort two

The Providence Journal is one of the foremost newspapers of Rhode Island, and is widely circulated in a busy manufacturing district.

400 Newspapers Regularly Quote

THE IRON TRADE REVIEW

CLEVELAND

The international reputation and the World-wide circulation of THE IRON TRADE REVIEW is the result of year after year of unfailing Editorial accuracy and reliability.

PROOF—

THE IRON TRADE REVIEW

"The Most Widely Quoted Trade Paper In The World"

Iron and Steel Scrap Prices

CORRECTED TO TUESDAY NOON GROSS TONS DELIVERED TO CONSUMER

Steel Works Scrap

HEAVY MELTING STEEL

Pittsburgh	$13.00 to 13.50
Chicago	11.50 to 12.00
Eastern Pennsylvania	12.00 to 12.50
Cleveland	12.00 to 13.00
St. Louis	11.50 to 12.00
Buffalo	12.50 to 13.00
New York (dealers)	7.50 to 8.00
Birmingham	11.50 to 12.00
Cincinnati	10.00 to 10.50
Valleys	12.50 to 13.00
Boston (dealers)	7.00 to 7.50
Detroit (dealers)	7.00 to 7.50

BUNDLED SHEETS

Pittsburgh	$ 9.00 to 10.00
Eastern Pennsylvania	8.50
Cleveland	7.00 to 7.50
Buffalo	7.00 to 8.00
Cincinnati	7.00 to 7.50
St. Louis	5.00 to 5.50

STEEL RAILS, SHORT

Chicago	$14.00 to 14.50
Boston (dealers)	8.00 to 9.00
Cleveland	12.00 to 13.00
St. Louis	12.25 to 12.75
Birmingham	12.00 to 14.00
Cincinnati	15.50 to 16.00

STOVE PLATE

Pittsburgh	$13.00 to 14.00
Chicago	15.00 to 15.50
Eastern Pennsylvania	13.50
Cleveland	14.50 to 15.00
Detroit	12.00 to 12.50
Birmingham	11.50 to 13.50
Buffalo	15.00 to 16.00
New York	8.50 to 9.00
St. Louis	13.50 to 14.00
Cincinnati	10.50 to 11.00
Boston	12.00 to 13.00

LOW PHOSPHORUS

Pitts. billet and bloom crops	$18.00 to 19.00
Cincinnati	20.00 to 21.00
Buffalo	18.00 to 19.00
Eastern Pennsylvania	16.00 to 17.00

SHOVELING STEEL

Chicago	$11.00 to 11.50
St. Louis	10.50 to 11.00
Pittsburgh	9.00 to 10.00

KNUCKLES, COUPLERS & SPRINGS

Pittsburgh	$14.00 to 15.00
Chicago	13.50 to 14.00
St. Louis	12.00 to 12.50
Eastern Pennsylvania	15.00 to 16.00

COMPRESSED SHEETS

Pittsburgh	$10.00 to 11.00
Chicago	8.00 to 8.50
Buffalo	9.00 to 9.50

FROGS, SWITCHES, GUARDS

Chicago	$11.50 to 12.00
St. Louis	11.50 to 12.00
Eastern Pennsylvania	12.00 to 12.50

BOILER PLATE, CUT

Detroit (dealers)	$6.00 to 6.50
St. Louis	7.00 to 7.50

ANGLE BARS—STEEL

Chicago	$12.50 to 13.00
St. Louis	12.00 to 12.50

Iron Mill Scrap

RAILROAD WROUGHT

Pittsburgh, No. 1	$12.00 to 13.00
Pittsburgh, No. 2	13.00 to 13.50
Chicago, No. 1	11.50 to 12.00
Chicago No. 2	11.00 to 11.50
Eastern Pennsylvania, No. 1	15.00 to 16.00
Cleveland No. 1	13.00 to 13.50
St. Louis, No. 1	12.00 to 12.50
St. Louis, No. 2	11.50 to 12.00
Buffalo	13.00 to 14.00
Cincinnati, No. 1	9.50 to 10.00
Birmingham, No. 1	11.50 to 13.50
New York, No 1 (dealers)	12.50 to 13.00
Boston (dealers)	9.00 to 10.00

WROUGHT PIPE

Eastern Pennsylvania	$13.00 to 13.50
Buffalo	9.50 to 10.50
New York (dealers)	8.00 to 8.50
Boston (dealers)	7.50 to 8.00

YARD WROUGHT

Boston	$8.00 to 9.00
Eastern Pennsylvania No. 1	12.00 to 13.00

CITY WROUGHT

New York, long	$10.00 to 10.50

BUSHELING

Pittsburgh	$13.00 to 13.50
Chicago, No. 1	10.75 to 11.25
Chicago, No. 2	7.50 to 8.00
Cleveland, No. 1	8.50 to 9.00
Cleveland, No. 2	6.50 to 7.00
St. Louis, No. 1	11.50 to 12.00
Buffalo, No. 1	9.50 to 10.50
Cincinnati, No. 1	10.00 to 11.00
Eastern Pennsylvania, No. 1	13.50 to 14.50

MACHINE SHOP TURNINGS

Pittsburgh	$ 8.00 to 8.50
Chicago	3.50 to 4.50
Eastern Pennsylvania	8.50
Cleveland	6.50 to 7.00
Buffalo	7.00 to 8.00
New York (dealers)	4.00 to 5.00
St. Louis	5.00 to 5.50
Detroit (dealers)	3.00
Cincinnati	3.50 to 4.00
Birmingham	6.00 to 7.00
Valleys	6.50 to 7.00
Boston (dealers)	3.00 to 3.50

CAST IRON BORINGS

Pittsburgh	$ 9.00 to 10.00
Chicago	7.00 to 7.50
Eastern Pennsylvania	9.00 to 9.50
Eastern Pennsylvania (chem.)	10.00 to 11.00
Cleveland	7.50 to 8.00
St. Louis	7.75 to 8.25
Detroit (dealers)	4.50
Buffalo	7.00 to 8.00
New York (dealers' price)	4.50 to 5.00
Cincinnati	3.50 to 4.00
Birmingham	6.00 to 7.00
Valleys	10.00 to 10.50
Boston (dealers)	3.00 to 3.50
Boston (chemical)	3.50 to 4.00

MIXED BORINGS AND TURNINGS

(For blast furnace use)

Boston (dealers)	$2.00 to 2.50
Eastern Pennsylvania	8.50
Cleveland	8.00 to 8.50

IRON AXLES

Pittsburgh	$21.00 to 22.00
New York (dealers)	22.00 to 23.00
Chicago	21.50 to 22.00
Eastern Pennsylvania	30.00 to 31.00
Detroit	26.00 to 27.00
Cleveland	20.50 to 21.50
St. Louis	23.00 to 23.50
Buffalo	26.00
Cincinnati	21.50 to 22.50
Birmingham	22.00 to 23.00

IRON RAILS

Chicago	17.00 to 17.50
Cleveland	14.00 to 15.00
St. Louis	12.50 to 13.00
Buffalo	21.00 to 22.00
Cincinnati	14.00 to 15.00

PIPES AND FLUES

Chicago	8.00 to 8.50
Cleveland	7.50 to 8.00
Detroit	6.00 to 6.50
St. Louis	9.00 to 9.50
Cincinnati	7.00 to 7.50

RAILROAD GRATE BARS

Chicago	$12.50 to 13.00
Cleveland	14.75 to 15.25
Detroit	10.50 to 11.00
St. Louis	8.00 to 8.50
Buffalo	11.50 to 12.50
New York (dealers)	12.00 to 12.50
Eastern Pennsylvania	13.00 to 13.50

FORGE FLASHINGS

Cleveland, large	$9.00 to 10.00
Cleveland, small	7.75 to 8.25
Chicago, small	8.00 to 8.50
Boston (dealers)	7.00 to 7.50

FORGE SCRAP

Chicago	$11.00 to 11.50
Eastern Pennsylvania, No. 1	10.50 to 11.00
Boston	7.00 to 7.50

ARCH BARS AND TRANSOMS

Chicago	$17.50 to 18.00
St. Louis	15.50 to 16.00

ANGLE BARS—IRON

Chicago	$16.50 to 17.00
St. Louis	13.00 to 13.50

Iron and Steel Works Scrap

AXLE TURNINGS

Pittsburgh	$10.00 to 11.00
Eastern Pennsylvania	11.00 to 12.00
Boston (dealers)	3.50 to 4.00
St. Louis	5.50 to 6.00
Detroit	6.50 to 7.50
Cleveland	8.50 to 9.50
Buffalo	10.00 to 11.00
Chicago	8.50 to 9.00

STEEL CAR AXLES

Pittsburgh	$15.00 to 16.00
Eastern Pennsylvania	17.00 to 18.00
Cleveland	19.00 to 20.00
St. Louis	16.00 to 16.50
Buffalo	20.00 to 21.00
Chicago	15.50 to 16.00
New York (dealers)	12.50 to 13.00
Birmingham	15.00 to 16.00
Boston (dealers)	14.00 to 14.50

SHAFTING

Eastern Pennsylvania	$18.00 to 19.00
St. Louis	13.00 to 13.50
New York (dealers)	12.00 to 13.00
Chicago	19.50 to 20.50
Boston (dealers)	12.00 to 13.00
Pittsburgh	15.00 to 16.00

Iron Foundry Scrap

CAR WHEELS

Pittsburgh, steel	14.00 to 15.00
Pittsburgh, steel	13.50 to 14.50
Chicago, iron	14.50 to 15.00
Eastern Pennsylvania, iron	18.00 to 19.00
Cleveland, iron	35.00 to 36.50
St. Louis, iron	13.00 to 13.50
Buffalo, iron	13.50 to 14.00
Birmingham, iron	12.00 to 13.50
Birmingham, tram car	11.50 to 13.50
Boston (consumers)	19.00 to 20.00
Cincinnati	13.00 to 14.00
New York, iron	13.00 to 13.50
Detroit	13.00
St. Louis, railroad	13.50 to 14.00

NO. 1 CAST SCRAP

Pittsburgh, cupola	$16.00 to 17.00
Chicago, cupola	15.50 to 16.00
Eastern Pennsylvania, cupola	17.50 to 18.50
Cleveland, cupola	18.50 to 19.00
New York cupola (dealers)	15.00 to 15.50
Cincinnati, No. 1, machinery, cupola, (net)	13.50 to 14.50
Birmingham, cupola	11.50 to 13.50
St. Louis, agricultural	13.50 to 14.00
Buffalo	18.00 to 18.50
Boston (consumers)	18.00 to 19.00
Valleys	18.00 to 19.00

HEAVY CAST

New York (dealers)	$14.50 to 15.00
Buffalo	16.00 to 16.50
Pittsburgh	14.00 to 15.00
Cleveland	12.00 to 12.50
Boston (consumers)	15.00 to 16.00

MALLEABLE

Pittsburgh, railroad	$13.00 to 14.00
Pittsburgh, agricultural	11.00 to 12.00
Chicago, railroad	14.00 to 14.50
Chicago, agricultural	14.00 to 14.50
Eastern Pennsylvania, railroad	15.00 to 16.00
Cleveland, railroad	14.00 to 14.50
Cleveland, agricultural	11.00 to 11.50
St. Louis, railroad	10.50 to 11.00
St. Louis, agricultural	10.00 to 10.50
Cincinnati, railroad	9.50 to 11.00
Cincinnati, agricultural	10.00 to 11.00
Boston, railroad	14.00 to 15.00
Buffalo	11.50 to 12.50
Detroit	9.00 to 9.50

Miscellaneous Scrap

RE-ROLLING RAILS

5 feet and over

Pittsburgh district	$14.00 to 15.00
Chicago	13.00 to 13.50
Eastern Pennsylvania	16.50 to 17.50
Cleveland	15.00 to 15.50
St. Louis	12.25 to 12.75
Birmingham	12.50 to 13.00
Boston (dealers)	10.00 to 10.50
New York (dealers)	14.00 to 15.00

LOCOMOTIVE TIRES

Chicago	$12.00 to 13.00
St. Louis	10.00 to 10.50

LOW PHOSPHORUS PUNCHINGS

Chicago	12.50 to 13.00
Eastern Pennsylvania	15.00 to 16.00
Pittsburgh	14.00 to 15.00

When the Scrap Market Is Dull

While seeking a more favorable market the best form in which to hold your sheet scrap, etc., and the form that always commands the best prices is the dense hydraulically compressed bundle.

Thus less storage space is required—under roof to prevent loss from corrosion; and because of greater car tonnage under minimum car rate, you add from 25% to 50% freight savings to your profits.

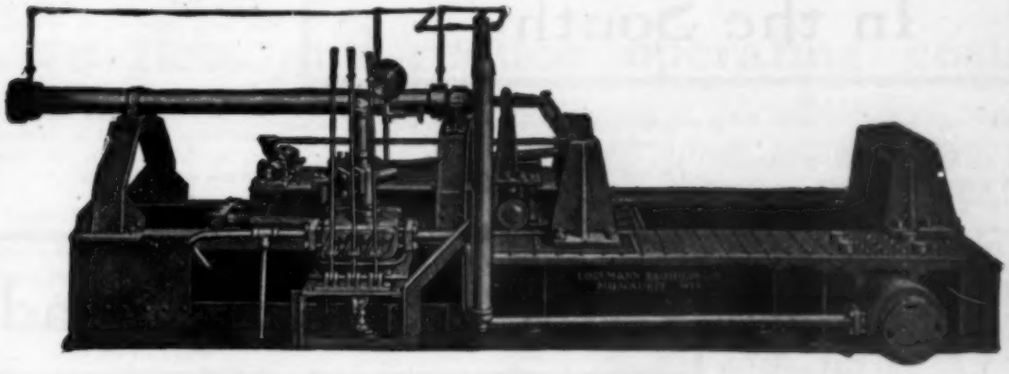
For greatest compression, largest daily output, at lowest operating cost, use

LOGEMANN Double Ram Hydraulic Scrap Metal PRESSES

You can enjoy the advantage of the accumulated experience from hundreds of Logemann scrap bundling presses now in use.

They embody a simplified mechanism that requires no special skill to operate rapidly. Press and pump are so designed that all the motive power applied is utilized, thus reducing power cost.

Powerfully built, all working parts constructed to resist the severest strains—selected material, first class workmanship—all minimize upkeep cost and insure lasting efficiency.



A medium sized press is shown; there are smaller and larger sizes in standard models.

Advise character and daily tonnage of your scrap and let us suggest press best suited to your requirements.

Logemann Brothers Co.

3126 Burleigh Street
Milwaukee, Wis.

Builders of Baling Presses and Hydraulic Machinery

(*Continued from page* 1550)

tric Appliance Co., Milwaukee, is reported planning to move its plant to this city.

INDIANAPOLIS—The J. Solotken Co., scrap iron, etc., has been incorporated with $15,000 capital, by Sam Dobrowitz, Henry Abrams and J. W. Joseph.

JEFFERSONVILLE, IND.—Henry Lang has acquired a controlling interest in the George Anderson Foundry Co., with which he has been identified since 1880.

MISHAWAKA, IND.—The Perkins Corp. has been incorporated with $750,000 capital stock, by C. A. Carlisle, E. H. Williams, Fred L. Hunt and others, to manufacture gasoline engines, machinery, etc.

TERRE HAUTE, IND.—The blacksmith and machine shops of the American Car & Foundry Co. recently were damaged by fire.

AKRON, O.—The Surgeons Rubber Glove Co. is having plans drawn for a plant building, at Cuyahoga Falls, O.

AKRON, O.—The Saniklene Chemical Co. has been incorporated with $500 capital by J. H. Wachener, D. R. Wachener, Louis Metzger and others.

AKRON, O.—The Ohio Metal Stamping & Mfg. Co. has been incorporated with $50,000 capital stock, by R. B. Spake, C. L. Johnson, Robert Guinther, Etta Hamlen and others.

CLEVELAND—The Polar Spray Dispenser Co. has been incorporated with $1000 capital, by P. F. Kennedy, Joseph J. Ryan, and others.

CLEVELAND—The Buckeye Novelty Mfg. Co. has been incorporated with $500 capital by B. L. Farmer, F. B. Fults and others.

CLEVELAND—The Viaduct Furnace & Roofing Co. has been incorporated with $12,000 capital by Winn, H. D. Scharfeld and Z. F. Porter.

CLEVELAND—The St. Clair Electric Fixture Co. has been incorporated with $10,000 capital, by M. H. Blumenthal, Ray J. Good, and others.

CLEVELAND—The Schofield Mfg. Co. has been incorporated with $50,000 capital, by Frank H. Schofield, V. C. Bassage, G. L. Chandler, Clifford S. Goby and T. I. Long.

DAYTON, O.—The Aircraft Engineering Co. has been incorporated with $50,000 capital by W. A. Penrod, B. W. Dawson, John Connolly and others.

DAYTON, O.—The Dayton Adjustable Bracket Co. has been incorporated with $5000 capital by Walter G. Haas, A. W. Holbrook, George Burrer, Frank L. Humphrey and F. R. Flory.

EAST LIVERPOOL, O.—The manufacturing plant of the Gloninger Brick Co., located near Vanport, Pa., recently was damaged by fire. It will be rebuilt.

MASSILLON, O.—The Ohio Central Oil & Gas Co. has increased its capital stock from $104,758 to $300,000.

NEW COMERSTOWN, O.—The Rex File Co. is having plans drawn for a plant addition.

SHELBY, O.—Plans are being drawn for an addition to the plant of the Shelby Sales Book Co., to cost about $40,000.

CHISHOLM, MINN.—W. A. Masters, clerk of the independent school district, has called for bids for new machine shop equipment for the local high school. New furnishings for the tool room and several machines will be installed.

FARIBAULT, MINN.—The Foss Motor Co. plans the erection of a 2-story service and repair building, 60 x 132 feet, to cost about $50,000.

MINNEAPOLIS—The Twin City Separator Co. plans a factory addition, 1-story.

In the South

LOUISVILLE, KY.—The Wilhelm & Schnur Electric Co. has been incorporated with $15,000 capital by August Schnur, T. Schnur and Albert Wilhelm.

LOUISVILLE, KY.—The C. J. Kerbel Co., machinery, recently was incorporated with $15,000 capital by C. J. Kerbel, C. F. Kerbel and Roy Herbatef.

LOUISVILLE, KY.—Jacob A. Schneider & Co., foundry and general machine work, has been incorporated with $3000 capital by A. Schneider, M. M. Schneider and W. Wallace Cox.

LOUISVILLE, KY.—The William C. Krauth Electric Co., 115 West Market street, plans to increase its capital stock to $50,000, to manufacture parts for electrical apparatus, etc. William C. Krauth is president and manager of the company.

OWENSBORO, KY.—The Smith Machine & Supply Co. has been incorporated with $10,000 capital, by Charles T. Smith, J. D. Church and Frank T. Faith.

UNIONTOWN, KY.—The Union County Mining Co. contemplates making improvements to its plant.

GREAT FALLS, S. C.—The Southern Power Co. is reported planning to enlarge its plant.

WINSTON-SALEM, N. C.—The Southern Iron & Steel Corp. has increased its capital stock from $50,000 to $125,000 and is reported planning to erect a plant.

CEDARTOWN, GA.—The Brewer Automobile Headlight Co., recently organized, plans to establish a plant for the manufacture of its products. I. L. St. Clair is president of the company.

BIRMINGHAM, ALA.—The Robinson Carburetor Co. has let a contract for the erection of a factory building, 40 x 90 feet, to be built at an estimated cost of $6000.

JACKSONVILLE, FLA.—The Tilt-A-Lock Co. has been incorporated with $300,000 capital stock, by E. H. Rogers, R. O. Birchy, A. D. Richardson, R. E. Wheeler and others.

NEWTON, LA.—The Monroe Cotton Oil Co. plans to rebuild its plant which was recently damaged by fire.

ST. LOUIS—The Davie Motor Car Co. plans a garage and machine shop, 1-story, 100 x 270 feet, to cost about $85,000.

ST. LOUIS—The Premocar Automobile Co., 2109 Olive street, has been organized to manufacture automobiles and parts, by William Piskulic and E. A. Rotayik.

SAND SPRINGS, OKLA.—The Tulsa Stone & Foundry Co. has been incorporated with $150,000 capital stock, by A. C. Spitnagel, E. M. Yates, George Kinnery and others.

DALLAS, TEX.—The Dallas Wheel & Rim Co. has been incorporated with $35,000 capital stock, by C. J. Kennedy, Frederick and H. L. Prior and others, to manufacture metal wheels, rims, etc.

WACO, TEX.—The Wonder Trap Co. plans to erect a plant, 100 x 165 feet, at an estimated cost of $12,000. The company recently increased its capital stock to $100,000. W. F. Sonneman is president.

DENVER, COL.—The plant of the American Auto Wrecking & Iron Metal Co. recently was damaged by fire.

HUNTINGTON PARK, CAL.—The John F. Riley Co., 260 North Pacific boulevard, plans the erection of a 1-story automobile service and repair building, 105 x 150 feet, to cost about $42,000.

LOS ANGELES—The Excello Products Co. has been organized to manufacture machinery and tools, by H. D. Eberle and Harry C. Newman, 817 H. W. Hellman building.

OAKLAND, CAL.—Slater & Williams, Inc., have been incorporated with $25,000 capital, to manufacture and deal in ornamental iron, brass, etc., by G. L. Slater, 301 Clay street, T. G. Williams and J. Taylor.

Business in Canada

LEDUC, ALTA.—A by-law has been carried by the ratepayers for the purpose of erecting an electric lighting plant here at a cost of $20,000. Secretary-treasurer, A. G. Campbell.

SACKVILLE, N. B.—The National Household Appliances, Ltd., has been incorporated to manufacture washing machines, etc., with $400,000 capital stock, by E. H. Fillmore, L. E. B. Smith and others.

MONTREAL, QUE.—The Hold-Mar Vacuum Piston Co., Ltd., has been incorporated with $150,000 capital stock, by R. T. Stackhouse, S. G. Dixon, R. E. Allen and others.

QUEBEC, QUE.—Furno, Ltd., has been incorporated to manufacture and deal in office furniture, typewriters, etc., with $50,000 capital stock, by Joseph A. Y. Bouchard, Alfred Marois, Auguste Sirois, and others.

MONTREAL, QUE.—The British Magnesite Co., Ltd., has been incorporated to carry on business as a mining, milling and reduction company, with $100,000 capital stock, by Louis P. Crepeau, Maurice Dugas, Segfried H. R. Bush and others.

MONTREAL, UE.—The Star Trunk & Bag Mfg. Co., Ltd., has been incorporated to manufacture trunks, bags, leather and metal goods, etc., with $49,000 capital stock, by Isidore Cohen, Moses A. Greenblatt, Maxwell I. Sigler, and others.

EAST LONDON, ONT.—Warren Bros., 314 Talbot street, are contemplating a machine shop here to cost $25,000, and will require equipment.

Whiting Bucket Crane handling fertilizer in plant of
G. Ober & Sons, Savannah, Ga.

Whiting Bucket Cranes

save time and reduce operating costs

in handling sand, gravel, cinders, coal, fertilizer and other loose materials. One man and a Whiting Crane replace a big gang of shovelers.

Let us help you solve your handling problems.

Other Whiting Products

Cupolas Converters
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Dust Arresters
Core Oven Equipment
Cars and Trucks
Turntables Trolley Systems
Air Hoists Elevators
Brass & Malleable Furnaces
Sand Cutting & Screening Machines

Send for catalog 151

WHITING Corporation

(Formerly Whiting Fdy. Equipment Co.)
Harvey, Ill., (Chicago Suburb)
Representatives in 25 Principal Cities

WHITING CRANES
FOUNDRY EQUIPMENT
RAILWAY SPECIALTIES

Iron and Steel Prices

Iron Ore

Superior Ores, Per Ton, Lower Lake Ports
Old range Bessemer, 55 per cent iron..$7.45
Mesabi Bessemer, 55 per cent iron.... 7.20
Old Range nonbessemer, 51½ per cent iron 6.70
Mesabi nonbessemer, 51½ per cent iron 6.55
Port Henry Iron Ore, f.o.b. Port Henry
Old bed 21 furnace.....$5.80
Old bed concentrates, 63 per cent..... 6.70
Harmony, cobbed, 63 per cent..... 6.70
New bed, low phos., 65 per cent..... 9.50
Lump ore for fix..... 7.00

Manganese Ore

Brazilian, 48 to 50 per cent c.i.f. Atlantic ports, nominal.

Indian 48 to 50 per cent c.i.f. Atlantic ports, 26 to 27 cents per unit, nominal.

Fluor Spar

Washed gravel Kentucky and Illinois mines, per ton..... nom. $20.00

Warehouse Prices

STEEL BARS

Boston	3.53c
Chicago	3.13c
Cleveland	2.99c
Detroit	3.18c
Philadelphia	3.20c
New York	3.23c
St. Louis	3.225c
Cincinnati	3.58c
St. Paul	3.41c
Buffalo	3.15c
San Francisco	4.35c
Seattle	4.25c

IRON BARS

Boston	3.53c
Buffalo	4.20c
Chicago	3.13c
Detroit	3.18c
St. Louis	3.225c
Cincinnati	3.58c
Philadelphia	3.20c
New York	3.23c

SHAPES

Chicago	3.23c
Detroit	3.28c
Boston	3.63c
St. Louis	3.325c
St. Paul	3.51c
New York	3.23c to 3.33c
Cleveland	3.09c
Philadelphia	3.30c
Buffalo	3.25c
Cincinnati	3.68c
San Francisco	4.45c
Seattle	4.45c

PLATES

Buffalo	3.47c
Chicago	3.23c
Detroit	3.28c
Boston	3.83c
St. Louis	3.325c
St. Paul	3.51c
New York	3.23c to 3.33c
Cleveland	3.09c
Philadelphia	3.30c
Cincinnati	3.60c
San Francisco	4.50c
Seattle	4.50c

NO. 10 BLUE ANNEALED SHEETS

New York	4.23c
Philadelphia	4.20c
Chicago	4.13c
Cleveland	4.00c
Boston	4.83c
Buffalo	4.15c
Detroit	4.18c
St. Louis	4.225c
Cincinnati	4.78c
St. Paul	4.61c
San Francisco	6.00c
Seattle	6.00c

NO. 28 BLACK SHEETS

Chicago	5.40c
New York	5.38c
Philadelphia	5.00c
Cleveland	4.80c to 5.00c
Boston	5.85c
Cincinnati	5.68c
Detroit	5.33c
St. Louis	5.495c
St. Paul	5.68c
Buffalo	5.30c
San Francisco	7.00c
Seattle	6.95c

NO. 28 GALVANIZED SHEETS

Chicago	6.40c
New York	6.00c to 6.38c
Philadelphia	6.00c
Boston	6.85c
Cleveland	5.70c to 6.00c
Cincinnati	6.78c
Detroit	6.33c
Buffalo	6.30c
St. Louis	6.35c
San Francisco	8.00c
Seattle	7.95c

Freight Rates

PIG IRON

Mahoning and Shenango valleys to:

Cleveland	$1.96
Newark, N. J.	6.72
Boston	7.28
Philadelphia	6.32
Pittsburgh	1.96
Chicago	5.32
St. Louis	6.44
Minneapolis, St. Paul	7.60

Buffalo to:

Albany, N. Y.	$2.52
New England (rail)	5.46
New York and Brooklyn (rail)	5.46

Virginia furnaces to:

Philadelphia	$5.74
New England	6.58
Brooklyn, Jersey City, Newark	6.16

Birmingham, Ala., to:

Boston	$10.665
Boston (rail and water)	7.65
Cincinnati	4.50
Chicago	6.66
Cleveland	6.66
Louisville, Ky.	4.12
Minneapolis, St. Paul	9.73
New York	10.26
Philadelphia	8.665
Pittsburgh	7.60
Savannah, Ga.	4.25
St. Louis	5.725

Chicago to:

Des Moines	$4.725
Minneapolis, St. Paul	3.375
Milwaukee	0.89
Moline, Ill.	1.89
Omaha	6.07
St. Louis	2.725

Ironton and Jackson, O., to:

Chicago	$5.32
Cincinnati	2.52
Cleveland	3.36
Detroit	3.64
Indianapolis	3.22
Minneapolis, St. Paul	8.40

FINISHED MATERIAL

Pittsburgh, carloads, per 100 lbs., to:

New York	$0.38
Philadelphia	0.35
Boston	0.415
Buffalo	0.295
Baltimore	0.335
Cleveland	0.24
Cincinnati	0.32
Chicago	0.38
Detroit	0.32
Minneapolis and St. Paul	0.66
Denver	1.32
St. Louis	0.475
New Orleans	0.515
Birmingham	0.765
Pacific coast (all rail)	1.665
Pacific coast (tin plate)	1.665

BANDS

New York	3.88c
Philadelphia	3.85c
Chicago	3.78c
Boston	4.23c
Detroit	3.83c
Buffalo	3.80c
San Francisco	5.05c
Seattle	4.95c

HOOPS

Buffalo	3.80c
Boston	4.90c
New York	4.28c
Philadelphia	3.85c
Detroit	3.83c

COLD ROLLED SHAFTING

Buffalo	4.65c
New York	4.73c
Philadelphia	4.60c
Chicago	4.63c to 5.13c
Boston	4.65c
San Francisco	6.25c
Seattle	6.25c
New York (shapes)	5.23c
Detroit	4.60c

Steel Pipe

Pittsburgh basing discounts, jobbers, carloads

STANDARD WEIGHT

Butt Weld

	Black	Galvanized
⅛-inch	50½	24
¼ and ⅜-inch	52½	26
½-inch	56½	42
¾-inch	60½	48
1 to 3-inch	62½	50

Lap Weld

2-inch	54½	42
2½ to 6-inch	58½	46
7 to 12-inch	54½	41
13 and 14-inch	45	..
15-inch	42½	..

PLUGGED AND REAMED

Butt Weld

1 to 3-inch	60½	48

Lap Weld

2-inch	52½	40
2½ to 6-inch	56½	44

EXTRA STRONG PLAIN ENDS

Butt Weld

⅛-inch	46½	29
¼ and ⅜-inch	48½	31
½-inch	53½	42
¾-inch	58½	47
1 to 1½-inch	60½	49
2 to 3-inch	61½	50

Lap Weld

2-inch	52½	41
2½ to 4-inch	56½	45
4½ to 6-inch	55½	44
7 to 8-inch	50½	37
9 to 12-inch	45½	32

DOUBLE EXTRA STRONG PLAIN ENDS

Butt Weld

½-inch	42½	32
¾ to 1½-inch	45½	35
2 to 2½-inch	47½	37

Lap Weld

2-inch	40½	31
2½ to 4-inch	42½	33
4½ to 6-inch	41½	32
7 to 8-inch	36½	23

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers, carloads

THREADS AND COUPLINGS

Butt Weld

	Black	Galvanized
¼ and ⅜-inch	plus 2½	plus 28½
½-inch	27½	9½
¾-inch	33½	18½
1 to 1½-inch	35½	20½

Lap Weld

2-inch	30½	16½
2½ to 6-inch	33½	20½
7 to 12-inch	29½	16½

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG, PLAIN ENDS

Butt Weld

¼ and ⅜-inch	plus 10½	plus 43½
½-inch	26½	14½
¾-inch	33½	19½
1 to 1½-inch	35½	21½

Lap Weld

2-inch	31½	18½
2½ to 4-inch	34½	22½
4½ to 6-inch	33½	21½
and 8-inch	24½	12½
to 12-inch	19½	7½

DOUBLE EXTRA STRONG, PLAIN ENDS

Butt Weld

½-inch	+36	+48
¾-inch	+16½	+28½
1-inch	+32½	+44½
1¼-inch	+16½	+28½
1½-inch	+15½	+27½

Lap Weld

2 and 2½-inch	+ 1½	+13½
3 to 4-inch	3½	+ 5½
4½ to 6-inch	2½	+ 6½
8-inch	+ 2½	

Boiler Tubes

STEEL

1¾-inch	19½
2 and ¼-inch	30
2½ to 3-inch	41
3¼ to 13-inch	47

IRON

1½-inch	+10
1¾ to 1⅞-inch	List
2 to 2¼-inch	10
2½ and 2¾-inch	15
3 and 3¼-inch	16
3½ to 4½-inch	20

Formerly it took eighteen men to do this work but today it's being done by one —

ERIE YARD CRANE

Just another instance typifying the true economical value of **Erie Cranes.**

This particular one is equipped with both a magnet-cable take-up reel and, as shown, arranged for use with a single line bucket.

It can thus sort scrap, load skips and deliver them directly to the charging platform; by means of a chute it keeps the foundry supplied with sand and coke, unloading directly from the cars. It handles all the raw material for this steel foundry.

Speed up **your** work with Erie Cranes.

Speed up your work with —

Erie CRANES

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNA.

New Trade Publications

HOISTS—The Chicago Pneumatic Tool Co. New York, is circulating a 16-page illustrated booklet in which air hoists, motors and winches are described and illustrated. Complete details and specifications are given.

INTERNAL MICROMETER—John Bath & Co., Inc., Worcester, Mass., is circulating a 12-page illustrated booklet in which an internal micrometer for internal measuring is described and illustrated. The instrument is described in detail.

SCREW PRODUCTS—The Standard Screw Products Co., Detroit, has published a 40-page illustrated booklet on screw machine products. One part of the booklet contains price lists and specifications while the other is a catalog of screw machine products made to special specifications.

COMPRESSORS—Air compressors and vacuum pumps are described and illustrated in a 16-page illustrated booklet recently published by the Pennsylvania Pump & Compressor Co., Easton, Pa. These compressors and pumps are either power or steam driven, and are built in straight line and single stage types.

BURNERS—The Hauck Mfg. Co., Philadelphia, is circulating a 16-page illustrated booklet in which burners for use in foundries, boiler, machine and repair shops are described and illustrated. The burners are illustrated and described in detail, the uses to which they are put in the various shops being described, etc.

FURNACE BURNERS—A 14-page illustrated booklet is being circulated by the Hauck Mfg. Co., Philadelphia, in which furnace burners and their uses are described and illustrated. These burners use oil for fuel and are built in four different designs. They are adapted for use in industrial plants of all kinds.

SAND CUTTING MACHINE—The American Foundry Equipment Co., New York, is circulating a 48-page booklet in which testimonial letters from users of the company's sand cutting machines are given. The various letters are from practically all parts of the country and are representative of the largest foundry operators' opinions of the sand cutting machines.

CEMENT—A 4-page illustrated folder is being circulated by the Stone Tar Products Co., Brooklyn, N. Y., in which the various uses to which its cement can be used, are described. These include the sealing of leaks, rust proofing, keeping of wayer clear and adds insulating heat units. According to the folder ⅛ of an inch thickness is sufficient to maintain a boiler and tank in a leak proof and rust free condition for five years.

ELECTRIC HOISTS—The Sprague Electric Works of the General Electric Co., Schenectady, N. Y., is circulating a 24-page illustrated booklet in which electric hoists and parts are described and illustrated. These hoists are built in capacities of from ¼ of a ton to 6 tons, and in two general types: One being wormed geared and the other spur geared. Both types are operated either on direct current and polyphase alternating current circuits. Full details are given and the illustrations show actual installations. Specifications are given.

Industrial Business Changes Recently Announced

OFFICES have been opened at 15 North Jefferson street, Chicago; Citizens building, Cleveland, and 213 First avenue, Minneapolis, by the American Spiral Spring & Mfg. Co., Pittsburgh. The Chicago office is in charge of E. P. Bartlett; the Cleveland office, W. R. McDonough, and the Minneapolis office, C. L. S. Holmes.

* * *

The name of the Chain Products Co., Norwalk, Conn., has been changed to the H. & O. Chain Co.

* * *

The Black & Decker Mfg. Co., Towson Heights, Md., has opened a Kansas City branch office at 1711 Grand avenue.

* * *

Officers of the Gierholtt Gas Motor Co., Detroit, have been moved to the company's plant at Marysville, Mich.

* * *

Removal of its machine tool sales division to new quarters at 38 Hendrie street, Detroit, has been announced by the Cadillac Tool Co., that city.

* * *

The Taylor-Brown Mfg. Co. has taken over the business of Walter B. Taylor, 280 Grove street, Worcester, Mass., and will extend the lines to the manufacture of automobile parts and finished bushings.

* * *

Announcement has been made by the Brown-Zortman Machinery Co., Pittsburgh, to the effect it has moved its offices from Union Arcade to 325 Second avenue.

* * *

The Stenman Electric Valve Grinding Co., 42 Southbridge street, Worcester, Mass., has changed its name to the Worcester Electric Tool Corp.

* * *

Offices have been opened at 903-905 Rialto building, San Francisco, by the Wheeling Steel Products Co., Wheeling, W. Va. W. A. Taylor has been appointed manager of the new offices.

* * *

Branch offices have been opened in the Pennsylvania building, Pittsburgh, in charge of A. Giraud Foote, by the Iron Trade Products Co., Pittsburgh.

* * *

Barbour, Love & Woodward, machine tool dealers, New York, have moved their offices from the Singer building, 149 Broadway, to their warehouse at Washington and Albany streets, where offices, showrooms and warehouses have been consolidated.

* * *

The Philadelphia Gear Works, Inc., 1120-1128 Pine street, Philadelphia, has opened a new factory, to be known as plant No. 2, and which it expected to be in full operation in a few weeks.

* * *

Downey Heating & Supply Co., Milwaukee, has announced that Frank E. Downey who has been connected with its contracting department, is now in charge of the company's jobbing and supply business. He will be assisted by Paul C. Downey.

* * *

Los Angeles offices have been opened at 508 Equitable Bank building, that city, by Andrew Carrigan & Co., San Francisco. Elmer C. Hutchinson, formerly sales manager for the Union Hardware & Metal Co., is manager of the new offices.

* * *

The M. J. Dougherty Co., Philadelphia, piping fabricator and contractor, has advised that its Atlanta representative's office has been changed to Candler Annex. The office is headquarters for the southeastern territory, including Florida, Georgia, Alabama, Tennessee, North Carolina and South Carolina.